GREGG WORLEY
EPA

North Carolina Department of Environment and Natural Resources
Division of Air Quality

Beverly Eaves Purdue
Governor

B. Keith Overcash, P.E.
Director

Dee Freeman
Secretary

May 10, 2010

Mr. Bryan Wuester
Landfill Manager
Sampson County Disposal LLC
7434 Roseboro Hwy
Roseboro, North Carolina 28382

Dear Mr. Wuester:

SUBJECT: **Air Quality Permit No. 09431T02**
Facility ID: 8200139
Sampson County Disposal LLC
Roseboro
Sampson County
Fee Class: Title V

In accordance with your completed Air Quality Permit Application for a PSD modification of a Title V permit received May 14, 2009, we are forwarding herewith Air Quality Permit No. 09431T02 to Sampson County Disposal LLC located at 7434 Roseboro Highway, Roseboro, North Carolina authorizing the construction and operation, of the emission sources and associated air pollution control devices specified herein. Additionally, any emissions activities determined from your Air Quality Permit Application as being insignificant per 15A North Carolina Administrative Code 2Q .0503(8) have been listed for informational purposes as an "ATTACHMENT." Please note the requirements for the annual compliance certification are contained in General Condition P in Section 3. The current owner is responsible for submitting a compliance certification for the entire year regardless of who owned the facility during the year.

The Permittee shall file a Title V Air Quality Permit Application pursuant to 15A NCAC 2Q .0504 for the air emission sources/control devices (ID Nos. ES-Gen-1 through Gen-8, CD-2, and CD-3) on or before 12 months after commencing operation.

As the designated responsible official it is your responsibility to review, understand, and abide by all of the terms and conditions of the attached permit. It is also your responsibility to ensure that any person who operates any emission source and associated air pollution control device subject to any term or condition of the attached permit reviews, understands, and abides by the condition(s) of the attached permit that are applicable to that particular emission source.

Permitting Section
1641 Mail Service Center, Raleigh, North Carolina 27699-1641
2728 Capital Blvd., Raleigh, North Carolina 27604
Phone: 919-715-6235 / FAX 919-733-5317 / Internet: www.ncair.org

One North Carolina *Naturally*

If any parts, requirements, or limitations contained in this Air Quality Permit are unacceptable to you, you have the right to request a formal adjudicatory hearing within 30 days following receipt of this permit, identifying the specific issues to be contested. This hearing request must be in the form of a written petition, conforming to NCGS (North Carolina General Statutes) 150B-23, and filed with **both** the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714 and the Division of Air Quality, Permitting Section, 1641 Mail Service Center, Raleigh, North Carolina 27699-1641. The form for requesting a formal adjudicatory hearing may be obtained upon request from the Office of Administrative Hearings. Please note that this permit will be stayed in its entirety upon receipt of the request for a hearing Unless a request for a hearing is made pursuant to NCGS 150B-23, this Air Quality Permit shall be final and binding 30 days after issuance.

You may request modification of your Air Quality Permit through informal means pursuant to NCGS 150B-22. This request must be submitted in writing to the Director and must identify the specific provisions or issues for which the modification is sought. Please note that this Air Quality Permit will become final and binding regardless of a request for informal modification unless a request for a hearing is also made under NCGS 150B-23.

The construction of new air pollution emission source(s) and associated air pollution control device(s), or modifications to the emission source(s) and air pollution control device(s) described in this permit must be covered under an Air Quality Permit issued by the Division of Air Quality prior to construction unless the Permittee has fulfilled the requirements of GS 143-215-108A(b) and received written approval from the Director of the Division of Air Quality to commence construction. Failure to receive an Air Quality Permit or written approval prior to commencing construction is a violation of GS 143-215.108A and may subject the Permittee to civil or criminal penalties as described in GS 143-215.114A and 143-215.114B.

For PSD increment tracking purposes, NOx emissions from this modification are increased by 19.69 pounds per hour, and PM10 emissions from this modification are increased by 5.91 pounds per hour.

This Air Quality Permit shall be effective from May 10, 2010 until ******, is nontransferable to future owners and operators, and shall be subject to the conditions and limitations as specified therein.

Should you have any questions concerning this matter, please contact Mr. Booker T. Pullen at (919) 715-6248.

***** This permit shall expire on the earlier of April 30, 2015 or the renewal of permit 09431T02 has been issued or denied.

Sincerely yours,

Donald R. van der Vaart, Ph.D., P.E.,
Chief

Enclosure

c: Gregg Worley, EPA Region 4
Fayetteville Regional Office
Central Files
Connie Horne (cover letter only)

Attachment to Permit No. 09431T02

Potential emissions do not exceed 5 tons per year of criteria pollutants and 1,000 pounds per year of any HAP

ID Nos.	Emission Source Description	Insignificant Regulation
IES-01	Two leachate storage tanks (297,000 gallon capacity each, ID Nos. 11 and 12)	15A NCAC 2Q .0503(8)
IES-02	One diesel-fired emergency generator (75 kW)	15A NCAC 2Q .0503(8)
IES-03	One diesel-fired emergency generator (75 kW)	15A NCAC 2Q .0503(8)
IES-04	One diesel-fired emergency generator (75 kW)	15A NCAC 2Q .0503(8)

Changes to existing Title V Permit No. 09431T01 per applications (8200139.09A):

Old Page No.	New Page No.	Condition No.	Changes
Page 1	Page 1	Cover letter	Changed date, revised permit number, changed name of responsible official, added PSD modification to description for type of permit, changed received date, added language about 12 month re-submittal of application after operation of proposed sources
Page 2	Page 2	Cover letter	Changed: date on letter, effective date of permit, issue date of permit. Revised cc list at bottom of page, revised signature name, added PSD increment tracking statement
Page 3	Page 3	Cover letter	Changed revision number, revised table of the changes to the permit per application No. 8200139.09A, added note concerning the expiration date of the permit
Body of the Permit			
Page 1	Page 1	Cover page	Changed: Permit No., "Replaces Permit No.", effective date of permit, application No., permit issue date, name of chief of Permitting.
All pages	All pages	Top of pages	Changed permit revision number
Page 3	Page 3	Permitted Emissions Sources	Removed the "Part I" designation from the top of the permit along with the two paragraphs, revised the table to reflect the proposed modification of this permit revision, revised the description of the permitted source (landfill)
N/A	Page 4	Specific Limitations and Conditions	Added primary (POS) and alternate operating scenario (AOS) to the table
N/A	Pages 5-10	Specific Limitations and Conditions	Added revised regulations for NSPS Subpart WWW to permit
N/A	Page 12-17	Specific Limitations and Conditions	Added regulatory requirements for the eight new genset units
N/A	Page 17	Multiple Emissions Section	Added Multiple Emissions Section 2.2
Pages 9-17	Pages 19-28	General Conditions	Added revised general conditions

State of North Carolina,
Department of Environment,
and Natural Resources
Division of Air Quality

AIR QUALITY PERMIT

Permit No.	Replaces Permit No.	Issue Date	Effective Date	Expiration Date
09431T02	09431T01	May 10, 2010	May 10, 2010	**

**This permit shall expire on the earlier of April 30, 2015 or the renewal of permit 09431T02 has been issued or denied.

Until such time as this permit expires or is modified or revoked, the below named Permittee is permitted to construct and operate the emission source(s) and associated air pollution control device(s) specified herein, in accordance with the terms, conditions, and limitations within this permit. This permit is issued under the provisions of Article 21B of Chapter 143, General Statutes of North Carolina as amended, and Title 15A North Carolina Administrative Codes (15A NCAC), Subchapters 2D and 2Q, and other applicable Laws.

Pursuant to Title 15A NCAC, Subchapter 2Q, the Permittee shall not construct, operate, or modify any emission source(s) or air pollution control device(s) without having first submitted a complete Air Quality Permit Application to the permitting authority and received an Air Quality Permit, except as provided in this permit.

Permittee:	**Sampson County Disposal LLC**
Facility ID:	**8200139**
Facility Site Location:	**7434 Roseboro Highway**
City, County, State, Zip:	**Roseboro, Sampson County, North Carolina, 28382**
Mailing Address:	**7434 Roseboro Highway**
City, State, Zip:	**Roseboro, Sampson County, North Carolina, 28382**
Application Number:	**8200139.09A**
Complete Application Date:	**May 14, 2009**
Primary SIC Code:	**4953**
Division of Air Quality, Regional Office Address:	**Fayetteville Regional Office 225 Green Street, Suite 714 Fayetteville, North Carolina 28301**

Permit issued this the **10th** day of **May, 2010**

Donald R. van der Vaart, Ph.D., P.E., Chief, Air Permits Section
By ~~Authority~~ of the Environmental Management Commission

Table Of Contents

SECTION 1- PERMITTED EMISSION SOURCES AND ASSOCIATED AIR POLLUTION CONTROL DEVICES AND APPURTENANCES

The following table contains a summary of all permitted emissions sources and associated air pollution control devices:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-1 **NSPS, MACT**	Municipal solid waste landfill facility	CD-GCCS-1 CD-Treatment **	One landfill gas collection and control system, equipped with a gas treatment system (CD-Treatment), and
		CD-1	One landfill gas-fired flare (141 million Btu per hour heat input capacity @ 500 Btu/cf HV, 4700 acfm)
		CD-2 **	One landfill gas-fired flare (141 million Btu per hour heat input capacity @ 500 Btu/cf HV, 4700 acfm)
		CD-3 **	One landfill gas-fired flare (21 million Btu per hour heat input capacity @ 500 Btu/cf HV, 700 acfm)
ES-Gen-1 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-2 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-3 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-4 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-5 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-6 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-7 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None
ES-Gen-8 ** **MACT, NSPS, PSD**	Landfill gas-fired genset unit (1600 kW, 2233 HP, lean burn)	None	None

** These emission sources and/or control devices (ID Nos. ES-Gen-1 through 8, CD-Treatment, CD-2, and CD-3) are listed as a 15A NCAC 2Q .0501(c)(2) modification. The Permittee shall file a Title V Air Quality Permit Application on or before 12 months after commencing operation in accordance with General Condition NN.1. The permit shield described in General Condition R does not apply and compliance certification as described in General Condition P is not required.

SECTION 2 - SPECIFIC LIMITATIONS AND CONDITIONS

2.1- Emission Source(s) and Control Devices(s) Specific Limitations and Conditions

The emission source(s) and associated air pollution control device(s) and appurtenances listed below are subject to the following specific terms, conditions, and limitations, including the testing, monitoring, recordkeeping, and reporting requirements as specified herein:

A. One Municipal Solid Waste landfill facility (ID No. ES-1) with associated gas collection and control system (ID No. CD-GCCS-1) equipped with one landfill gas treatment system (CD-Treatment) along with two candle stick-type utility flares (141 million Btu per hour heat input @ 500 Btu/cf landfill gas HV, 4700 acfm each, ID Nos. CD-1 and CD-2) and one candle stick-type "low flow" utility flare (21 million Btu per hour heat input @ 500 Btu/cf landfill gas HV, 700 acfm, ID No. CD-3)

The following table provides a summary of limis and standards for the emissions sources as described above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Nonmethane organic compounds (NMOC)	POS Operate the gas collection and control system to route landfill gas through a gas treatment system prior to being burned in the genset units, and/or AOS Operate the gas collection and control system to route landfill gas to open flare(s)	15A NCAC 2D .0524 **40 CFR Part 60, Subpart WWW**
Odorous emissions	Apply suitable odor control measures **State-enforceable only**	15A NCAC 2D .1806
Hazardous air pollutants (HAPs)	Work practice standards & startup, shutdown, and malfunction plan	15A NCAC 2D .1111 **40 CFR Part 63, Subpart AAAA**
Toxic air pollutants	Facility-wide toxics evaluation **"State-enforceable only"**	15A NCAC 2Q .0705 15A NCAC 2Q .0711
	Modeled emission rates **"State-enforceable only"**	15A NCAC 2D .1100

1. 15A NCAC 2D .0524: 40 CFR Part 60, Subpart WWW, New Source Performance Standards

a. Emissions of nonmethane organic compounds (NMOCs) from the landfill (ID No. ES-1) shall be controlled by a gas collection and control system (ID No. CD-GCCS1) that routes the gas to an open flare designed in accordance with 40 CFR §60.18 and/or to a gas treatment system in accordance with 40 CFR §60.752(b)(2)(iii)(C).

Testing [15A NCAC 2D .0524, 40 CFR §60.754]

b. When testing is required, the testing shall be performed in accordance with 40 CRF Part 60.752(b)(2)(iii)(A) and General Condition JJ located in the General Conditions in Section 3 of the permit. If the results are above the limit given in Section 2.1 A. 1. a. above, the Permittee shall be deemed in noncompliance with the NMOC standard in 40 CFR Part 60, Subpart WWW.

Operational Standards For Collection and Control Systems [40 CFR Part 60, §60.753]

c. Each owner or operator of a MSW landfill with a gas collection and control system used to comply with the provisions of §60.752(b)(2)(ii) of this subpart shall:

(A) Operate the collection system such that gas is collected from each area, cell, or group of cells in the MSW landfill in which solid waste has been in place for 5 years or more if active; or 2 years or more if closed or at final grade;

(B) Operate the collection system with negative pressure at each wellhead except under the following conditions:

(1) A fire or increased well temperature. The owner or operator shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in §60.757(f)(1);

(2) Use of a geomembrane or synthetic cover. The owner or operator shall develop acceptable pressure limits in the design plan;

(3) A decommissioned well. A well may experience a static positive pressure after shut down to accommodate for declining flows. All design changes shall be submitted for approval to the DAQ Regional Office;

(C) Operate each interior wellhead in the collection system with a landfill gas temperature less than 55 °C and with either a nitrogen level less than 20 percent or an oxygen level less than 5 percent. The owner or operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.

(1) The nitrogen level shall be determined using Method 3C, unless an alternative test method is established as allowed by §60.752(b)(2)(i).

(2) Unless an alternative test method is established as allowed by §60.752(b)(2)(i), the oxygen shall be determined by an oxygen meter using Method 3A or 3C except that:

(a) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span;

(b) A data recorder is not required;

(c) Only two calibration gases are required, a zero and span, and ambient air may be used as the span;

(d) A calibration error check is not required;(e) The allowable sample bias, zero drift, and calibration drift are ±10 percent.

(D) Operate the collection system so that the methane concentration is less than 500 parts per million above background at the surface of the landfill. To determine if this level is exceeded, the owner or operator shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visual observations indicate elevated concentrations of landfill gas, such as distressed vegetation and cracks or seeps in the cover. The owner or operator may establish an alternative traversing pattern that ensures equivalent coverage. A surface monitoring design plan shall be developed that includes a topographical map with the monitoring route and the rationale for any site-specific deviations from the 30 meter intervals. Areas with steep slopes or other dangerous areas may be excluded from the surface testing.

(E) Operate the system such that all collected gases are vented to a control system designed and operated in compliance with §60.752(b)(2)(iii). In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within 1 hour; and

(F) Operate the control or treatment system at all times when the collected gas is routed to the system.

(G) If monitoring demonstrates that the operational requirements in paragraphs §60.753(b), (c), or (d) are not met, corrective action shall be taken as specified in §60.755(a)(3) through (5) or §60.755(c). If corrective actions are taken as specified in §60.755, the monitored exceedance is not a violation of the operational requirements.

d. **Compliance Provisions** [40 CFR Part 60, §60.755]

i. For the purpose of demonstrating whether the gas collection system flow rate is sufficient to determine compliance with §60.752(b)(2)(ii)(A)(3), the owner or operator shall measure gauge pressure in the gas collection header at each individual well, monthly. If a positive pressure exists, action shall be initiated to correct the exceedance within 5 calendar days, except for the three conditions allowed under §60.753(b). If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance shall be submitted to the DAQ Regional Office for approval.

ii. Owners or operators are not required to expand the system as required in paragraph §60.755(a)(3) during the first 180 days after gas collection system startup.

iii. For the purpose of identifying whether excess air infiltration into the landfill is occurring, the owner or operator shall monitor each well monthly for temperature and nitrogen or oxygen as provided in §60.753(c). If a well exceeds one of these operating parameters, action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance shall be submitted to the DAQ Regional Office for approval.

.iv. An owner or operator seeking to demonstrate compliance with §60.752(b)(2)(ii)(A)(4) through the use of a collection system not conforming to the specifications provided in §60.759 shall provide information satisfactory to the Director as specified in §60.752(b)(2)(i)(C) demonstrating that off-site migration is being controlled.

v. For purposes of compliance with §60.753(a), each owner or operator of a controlled landfill shall place each well or design component as specified in the approved design plan as provided in §60.752(b)(2)(i). Each well shall be installed no later than 60 days after the date on which the initial solid waste has been in place for a period of 5 years or more if active; or 2 years or more if closed or at final grade.

vi. The following procedures shall be used for compliance with the surface methane operational standard as provided in §60.753(d).

(A) After installation of the collection system, the owner or operator shall monitor surface concentrations of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals (or a site-specific established spacing) for each collection area on a quarterly basis using an organic vapor analyzer, flame ionization detector, or other portable monitor meeting the specifications provided in §60.753(d).

(B) The background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells.

(C) Surface emission monitoring shall be performed in accordance with section 8.3.1 of Method 21 of appendix A of 40 CFR Part 60, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.

(D) Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified in paragraphs §60.755(c)(4) (i) through (v) shall be taken. As long as the specified actions are taken, the exceedance is not a violation of the operational requirements of §60.753(d).

(1) The location of each monitored exceedance shall be marked and the location recorded.

(2) Cover maintenance or adjustments to the vacuum of the adjacent wells to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.

(3) If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in paragraph §60.755(c)(4)(v) shall be taken, and no further monitoring of that location is required until the action specified in paragraph §60.755(c)(4)(v) has been taken.

(4) Any location that initially showed an exceedance but has a methane concentration less than 500 ppm methane above background at the 10-day re-monitoring specified in paragraph §60.755 (c)(4) (ii) or (iii) shall be re-monitored 1 month from the initial exceedance. If the 1-month remonitoring shows a concentration less than 500 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month remonitoring shows an exceedance, the actions specified in paragraph (c)(4) (iii) or (v) shall be taken.

(5) For any location where monitored methane concentration equals or exceeds 500 parts per million above background three times within a quarterly period, a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation shall be submitted to the DAQ Regional Office for approval.

(E) The owner or operator shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis.

(F) Each owner or operator seeking to comply with the provisions in paragraph §60.755(c) shall comply with the following instrumentation specifications and procedures for surface emission monitoring devices:

(1) The portable analyzer shall meet the instrument specifications provided in section 3 of Method 21 of appendix A of 40 CFR Part 60, except that "methane" shall replace all references to VOC.

(2) The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air.

(3) To meet the performance evaluation requirements in section 3.1.3 of Method 21 of appendix A of 40 CFR Part 60, the instrument evaluation procedures of section 4.4 of Method 21 of appendix A of this part shall be used.

(4) The calibration procedures provided in section 4.2 of Method 21 of appendix A of this part shall be followed immediately before commencing a surface monitoring survey.

(G) The provisions of this subpart apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices.h.

e. **Monitoring** [15A NCAC 2Q .0508(f), 40 CFR §60.756]

i. Each owner or operator seeking to comply with §60.752(b)(2)(ii)(A) for an active gas collection system shall install a sampling port and a thermometer, other temperature measuring device, or an access port for temperature measurements at each wellhead and:

(A) Measure the gauge pressure in the gas collection header on a **monthly** basis as provided in 40 CFR §60.755(a)(3);

(B) Monitor nitrogen or oxygen concentration in the landfill gas on a **monthly** basis as provided in 40 CFR §60.755(a)(5);

(C) Monitor temperature of the landfill gas on a **monthly** basis as provided in §60.755(a)(5); and

(D) Monitor surface concentrations of methane along the entire perimeter of the collection area (or site-specific established spacing) for each collection area on a **quarterly basis**.

ii. The owner or operator shall calibrate, maintain, and operate according to the manufacture's recommendations the following equipment **when using an open flare** to comply with this Subpart:
   (A) A heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence of a flame.
   (B) A device that records flow to or bypass of the flare. The owner or operator shall either:
      (1) Install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every 15 minutes; or
      (2) Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration. A visual inspection of the seal or closure mechanism shall be performed at least **once every month** to ensure that the valve is maintained in the closed position and that the gas flow is not diverted through the bypass line.

iii. Each owner or operator seeking to install a collection system that does not meet the specifications in 40 CFR §60.759, or seeking to monitor alternative parameters to those required by 40 CFR §60.753 through §60.756, shall provide information satisfactory to the EPA as provided in §60.752(b)(2)(i)(B) and (C) describing the design and operation of the collection system, the operating parameters that would indicate proper performance, and appropriate monitoring procedures.

f. **Recordkeeping** [40 CFR Part 60, §60.758]

i. Except as provided in §60.752(b)(2)(i)(B), each owner or operator of an MSW landfill subject to the provisions of §60.752(b) shall keep for at least 5 years up-to-date, readily accessible, on-site records of the design capacity report which triggered §60.752(b), the current amount of solid waste in-place, and the year-by-year waste acceptance rate. Off-site records may be maintained if they are retrievable within 4 hours. Either paper copy or electronic formats are acceptable.

ii. Except as provided in §60.752(b)(2)(i)(B), each owner or operator of a controlled landfill shall keep up-to-date, readily accessible records for the life of the control equipment of the data listed below in this section as measured during the initial performance test or compliance determination. Records of subsequent tests or monitoring shall be maintained for a minimum of 5 years. Records of the control device vendor specifications shall be maintained until removal.
   (A) Where an owner or operator subject to the provisions of this subpart seeks to demonstrate compliance with §60.752(b)(2)(ii):
      (1) The maximum expected gas generation flow rate as calculated in §60.755(a)(1). The owner or operator may use another method to determine the maximum gas generation flow rate, if the method has been approved by the DAQ.
      (2) The density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in §60.759(a)(1).
   (B) Where an owner or operator subject to the provisions of this subpart seeks to demonstrate compliance with §60.752(b)(2)(iii)(A) through use of an open flare, the flare type (i.e., steam-assisted, air-assisted, or nonassisted), all visible emission readings, heat content determination, flow rate or bypass flow rate measurements, and exit velocity determinations made during the performance test as specified in §60.18; continuous records of the flare pilot flame or flare flame monitoring and records of all periods of operations during which the pilot flame of the flare flame is absent.
   (C) Except as provided in §60.752(b)(2)(i)(B), each owner or operator of a controlled landfill subject to the provisions of this subpart shall keep for 5 years up-to-date, readily accessible continuous records of the equipment operating parameters specified to be monitored in §60.756 as well as up-to-date, readily accessible records for periods of operation during which the parameter boundaries established during the most recent performance test are exceeded.
   (D) Each owner or operator subject to the provisions of this subpart shall keep up-to-date, readily accessible continuous records of the indication of flow to the control device or the indication of bypass flow or records of monthly inspections of car-seals or lock-and-key configurations used to seal bypass lines, specified under §60.756.

(E) Each owner or operator seeking to comply with the provisions of this subpart by use of an open flare shall keep up-to-date, readily accessible continuous records of the flame or flare pilot flame monitoring specified under §60.756(c), and up-to-date, readily accessible records of all periods of operation in which the flame or flare pilot flame is absent.

(F) Except as provided in §60.752(b)(2)(i)(B), each owner or operator subject to the provisions of this subpart shall keep for the life of the collection system an up-to-date, readily accessible plot map showing each existing and planned collector in the system and providing a unique identification location label for each collector.

(G) Each owner or operator subject to the provisions of this subpart shall keep up-to-date, readily accessible records of the installation date and location of all newly installed collectors as specified under §60.755(b).

(H) Each owner or operator subject to the provisions of this subpart shall keep readily accessible documentation of the nature, date of deposition, amount, and location of asbestos-containing or nondegradable waste excluded from collection as provided in §60.759(a)(3)(i) as well as any nonproductive areas excluded from collection as provided in §60.759(a)(3)(ii).

(I) Except as provided in §60.752(b)(2)(i)(B), each owner or operator subject to the provisions of this subpart shall keep for at least 5 years up-to-date, readily accessible records of all collection and control system exceedances of the operational standards in §60.753, the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance. The Permittee shall be deemed in noncompliance with 15A NCAC 2D if thes records are not maintained.

g. **Specifications of Active Collection Systems** [40 CFR Part 60, §60.759]

i. Each owner or operator seeking to comply with §60.752(b)(2)(i) shall site active collection wells, horizontal collectors, surface collectors, or other extraction devices at a sufficient density throughout all gas producing areas using the following procedures unless alternative procedures have been approved by the Division of Air Quality as provided in §60.752(b)(2)(i)(C) and (D).

(A) The collection devices within the interior and along the perimeter areas shall be certified to achieve comprehensive control of surface gas emissions by a professional engineer, who is registered in the State of North Carolina. The following issues shall be addressed in the design plan: depths of refuse, refuse gas generation rates and flow characteristics, cover properties, gas system expandability, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end use, air intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.

(B) The sufficient density of gas collection devices determined above in this section shall address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.

(C) The placement of gas collection devices determined above in this section shall control all gas producing areas, except as provided below:

(1) Any segregated area of asbestos or nondegradable material may be excluded from collection if documented as provided under §60.758(d). The documentation shall provide the nature, date of deposition, location and amount of asbestos or nondegradable material deposited in the area. If any area of the landfill qualifies for exclusion under §60.758(d), the Permittee shall provide the stipulated data as a request for approval to the DAQ Regional Office.

(2) Any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. The amount location, and age of the material shall be documented and provided to the Division of Air Quality upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill. If any area of the landfill qualifies for exclusion under §60.759(a)(3)(ii), the Permittee shall provide the stipulated data by letter as a request for approval to the DAQ Regional Office.

h. **Well Closure** [40 CFR Part 60, §60.753]
If any gas collection well qualifies for exclusion under §60.753(b)(3) as a decommissioned well, the Permittee shall provide adequate documentation and data to justify well closure. This information shall be provided by letter to the DAQ Regional Office as a request for approval.

i. **Reporting** [40 CFR Part 60, §60.757]
(A) Each owner or operator seeking to comply with §60.752(b)(2) using an active collection system designed in accordance with §60.752(b)(2)(ii) shall submit to the Division of Air Quality annual reports of the recorded information listed below in this section.
(1) Value and length of time for exceedance of applicable parameters monitored under 40 CFR §60.756(a), (b), (c), and (d).
(2) Description and duration of all periods when the gas stream is diverted from the control device through a bypass line or the indication of bypass flow as specified in 40 CFR §60.756.
(3) Description and duration of all periods when the control device was not operating for a period exceeding one hour and length of time the control device was not operating.
(4) All periods when the collection system was not operating in excess of 5 days.
(5) The location of each exceedance of the 500 parts per million methane concentration and the concentration recorded at each location for which an exceedance was recorded in the previous month.
(6) The date of installation and the location of each well or collection system expansion added in accordance with 40 CFR §60.755(a)(3), (b), and (c)(4).
(7) Summary of all DAQ approved well closures that have been decommissioned in accordance with wells §60.753(b)(3).
(8) Summary of all DAQ approved nonproductive areas of the landfill in accordance with §60.759(a)(3)(ii).
(B) The initial annual report shall be submitted within 180 days of the installation and start-up of the collection and control system, and shall include the initial performance test report required under 40 CFR §60.8.
(C) The Permittee shall submit a **summary report** of monitoring and recordkeeping activities by January 30 of each calendar year for the preceding six-month period between July and December and July 30 of each calendar year for the preceding six-month period between January and June. All instances of deviations from the requirements of this permit must be clearly identified.

2. **15A NCAC 2D .1806: Control And Prohibition Of Odorous Emissions" (State-enforceable only)**
The Permittee shall not cause, allow, or permit any facility to be operated without employing suitable measures for the control of odorous emissions including wet scrubbers, incinerators, or other devices approved by the commission.

3. **15A NCAC 2D .1111, 40 CFR Part 63, Subpart AAAA: National Emission Standards for Hazardous Air Pollutants, Municipal Solid Waste Landfills**

Applicability
a. Sampson County Disposal, LLC Municipal Solid Waste Landfill (ID Nos. ES-1) shall comply with all requirements of 15A NCAC 2D .1111 "Maximum Achievable Control Technology" and 40 CFR Part 63, Subpart AAAA "National Emission Standards for Hazardous Air Pollutant, Municipal Solid Waste Landfills" [40 CFR, §63.1935]

Definitions and Nomenclature [40 CFR, §63.1990]
b. For the purpose of this permit condition, the definitions and nomenclature contained in 40 CFR, 63, §1990 shall apply.

REGULATED POLLUTANTS [40 CFR §63.2]

c. Hazardous Air Pollutant (HAP) means any air pollutant listed in or pursuant to section 112(b) of the Clean Air Act. [40 CFR §63.2]

40 CFR Part 63 Subpart A "GENERAL PROVISIONS"

d. The Permittee shall comply with the requirements of 40 CFR §63 Subpart A "General Provisions" according to the applicability of Subpart A to such sources as identified in 40 CFR Part 63, Subpart AAAA, §63.1935.

Compliance dates [40 CFR Part 63, §63.1945]

e. The Permittee (Sampson County Disposal, LLC) is an **existing affected area source** in accordance with 40 CFR Part 63, §63.1935 (a)(3). An area source is by definition a landfill that is not major due to the annual emission rate of HAPs, but one that has greater than 2.5 million megagrams (Mg) and 2.5 million cubic meters (m^3) and has estimated uncontrolled emissions equal to or greater than 50 megagrams per year (Mg/yr) NMOC emissions. This facility shall be in compliance with this regulation by the date this landfill is required to install a collection and control system in accordance with 40 CFR §60.752(b)(2) of the New Source Performance Standards, Subpart WWW. [§ 63.1945]

Monitoring [40 CFR Part 63, §63.1955 and §63.1960]

f. Compliance with this Subpart (AAAA) is determined in accordance with the New Source Performance Subpart WWW, including performance testing, monitoring of the collection system, continuous parameter monitor, and other credible evidence. In addition, continuous parameter monitoring data, collected under 40 CFR §60.756(c)(1) and (d) of Subpart WWW, are used to demonstrate compliance with the operating conditions for control systems.

The Permittee must develop and implement a written Start-Up/Shutdown/Malfunction (SSM) plan according to the provision in 40 CFR 63.6(e)(3). A copy of the SSM shall be maintained on site.

Deviation means any instance in which an affected source subject to this subpart, or an owner or operator of such a source:

i. fails to meet any requirement or obligation established by this subpart, including, but not limited to, any emissions limitation (including any operating limit) or work practice standard;
ii. fails to meet any term or condition that is adopted to implement an applicable requirement in this subpart and that is included in the operating permit for any affected source required to obtain such a permit;
iii. fails to meet any emission limitation, (including any operating limit), or work practice standard in this subpart during SSM, regardless of whether or not such failure is permitted by this subpart; or
iv. fails to write, develop, implement, or maintain a copy of the SSM plan.

If a deviation occurs, the Permittee has failed to meet the control device operating conditions describe in this subpart and have deviated from the requirements of this subpart.

Recordkeeping/Reporting Requirements [40 CFR Part 63, §63.1980]

g. Keep records and reports as specified in the general provisions of 40 CFR Part 60, and in Subpart WWW, except the annual report described in 40 CFR §60.757(f) shall be submitted every 6 months.

If actions taken during a startup, shutdown, and malfunction plan are consistent with the procedures in the startup, shutdown, and malfunction plan, this information shall be included in a semi-annual startup, shutdown, and malfunction plan report. Any time an action taken during a startup, shutdown and malfunction plan is not consistent with the startup, shutdown and malfunction plan, the source shall report actions taken within **2 working days** after commencing such action, followed by a letter **7 days** after the event.

B. Eight landfill gas-fired genset units (lean burn, 1600 kW, 2233 Hp output each, ID Nos. ES-Gen-1 through Gen-8)

The following table provides a summary of limits and standards for the emissions sources as described above:

Regulated Pollutant	Limits/Standards	Applicable Regulation
Sulfur dioxide	2.3 pounds per million Btu heat input	15A NCAC 2D .0516
Visible emissions	20 percent opacity	15A NCAC 2D .0521
CO, NOx, VOCs	NSPS Exhaust Emission Standards after 7/1/2007 CO: 5.0 g/Hp-hr or 610 ppmvd at 15% O_2 NOx: 3.0 g/Hp-hr or 220 ppmvd at 15% O_2 VOCs: 1.0 g/Hp-hr or 80 ppmvd at 15% O_2 NSPS Exhaust Emission Standards after 7/1/2010 CO: 5.0 g/Hp-hr or 610 ppmvd at 15% O_2 NOx: 2.0 g/Hp-hr or 150 ppmvd at 15% O_2 VOCs: 1.0 g/Hp-hr or 80 ppmvd at 15% O_2	15A NCAC 2D .0524 **40 CFR Part 60, Subpart JJJJ**
CO	BACT Limit: 13.54 lbs/hour (2.75 g/Hp-hour) each genset	15A NCAC 2D .0530 **PSD (BACT)**
NOx	BACT Limit: 2.46 lbs/hour (0.50 g/Hp-hour) each genset	
PM10	BACT Limit: 0.74 lbs/hour (0.15 g/Hp-hour) each genset	
PM2.5	BACT Limit: 0.74 lbs/hour (0.15 g/Hp-hour) each genset	
Odorous emissions	Apply suitable odor control measures State-enforceable only	15A NCAC 2D .1806
Hazardous	Meet the requirements of NSPS Subpart JJJJ	15A NCAC 2D .1111 **40 CFR Part 63, Subpart ZZZZ**
Air toxics	Facility-wide toxics evaluation See Multiple Emissions Section 2.2	15A NCAC 2Q .0705 15A NCAC 2Q .0711

1. **15A NCAC 2D .0516: Sulfur Dioxide Emissions From Combustion Sources**

   a. Emissions of sulfur dioxide from the genset units (ID Nos. ES-Gen-1 through Gen-8) shall not exceed **2.3 pounds per million Btu heat input**. Sulfur dioxide formed by the combustion of sulfur in fuels, wastes, ores, and other substances shall be included when determining compliance with this standard. [15A NCAC 2D .0516]

   Testing [15A NCAC 2D .0501(c)(4)]

   b. If emissions testing is required, the testing shall be performed in accordance with 15A NCAC 2D .0501(c)(4) and General Condition JJ found in Section 3. If the results of this test are above the limit given in Section 2.1 B. 1. a. above, the Permittee shall be deemed in noncompliance with 15A NCAC 2D .0516.

   Monitoring/Recordkeeping/Reporting [15A NCAC 2Q .0508(f)]

   c. No monitoring, recordkeeping, or reporting is required for sulfur dioxide emissions from firing landfill gas in the genset units.

2. **15A NCAC 2D .0521: CONTROL OF VISIBLE EMISSIONS**

   a. Visible emissions from the genset units (ID Nos. ES-Gen-1 through Gen-8) shall not be more than **20 percent opacity** each when averaged over a six-minute period. However, six-minute averaging periods may exceed 20 percent not more than once in any hour and not more than four times in any 24-hour period. In no event shall the six-minute average exceed 87 percent opacity. [15A NCAC 2D .0521 (d)]

   Testing [15A NCAC 2D .0501(c)(8)]

   b. If emissions testing is required, the testing shall be performed in accordance with 15A NCAC 2D .0501(c)(8) and General Condition JJ found in Section 3. If the results of this test are above the limit provided in Section 2.1 B. 2. a. above, the Permittee shall be deemed in noncompliance with 15A NCAC 2D .0521.

Monitoring/Recordkeeping/Reporting

c. No monitoring, recordkeeping, or reporting is required for visible emissions from the firing of landfill gas in the genset units.

3. **15A NCAC 2D .0524: New Source Performance Standards For Stationary Non-Emergency Spark Ignition Engines [40 CFR Part 60, Subpart JJJJ], "NOx, CO and VOCs"**
   - ES-Gen-1 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
   - ES-Gen-2 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
   - ES-Gen-3 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
   - ES-Gen-4 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
   - ES-Gen-5 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
   - ES-Gen-6 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
   - ES-Gen-7 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
   - ES-Gen-8 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)

a. The Permittee shall comply with all applicable provisions, including the requirements for emission standards, notification, testing, reporting, record keeping, and monitoring, contained in Environmental Management Commission Standard 15A NCAC 2D .0524 "New Source Performance Standards (NSPS)" as promulgated in 40 CFR Part 60 Subpart JJJJ, including Subpart A "General Provisions." [15A NCAC 2D .0524]

Emission Standards [40 CFR §60.4233(e)]

b. The Permittee shall comply with the following emission standards for spark ignition (SI) engines for model year manufactured after July 1, 2007. Owners and operators of stationary spark ignition internal combustion engines shall achieve the required emission standards over the entire life of each engine.

Exhaust emission standards (engine manufactured after July 1, 2007):	Exhaust emission standards (engine manufactured after July 1, 2010):
CO: 5.0 g/Hp-hr or 610 ppmvd at 15% O_2	CO: 5.0 g/Hp-hr or 610 ppmvd at 15% O_2
NOx: 3.0 g/Hp-hr or 220 ppmvd at 15% O_2	NOx: 2.0 g/Hp-hr or 150 ppmvd at 15% O_2
VOCs: 1.0 g/Hp-hr or 80 ppmvd at 15% O_2	VOCs: 1.0 g/Hp-hr or 80 ppmvd at 15% O_2

Testing [15A NCAC 2Q .0508(f), 40 CFR §60.8]

c. If emissions testing is required, the testing shall be performed in accordance with General Condition JJ of this permit. If the results of this test are above the limit given in Section 2.1 B. 3. b. above, the Permittee shall be deemed in noncompliance with 15A NCAC 2D .0524.

d. **Monitoring** [15A NCAC 2D .0524, 40 CFR Part 60, §60.4233(e)]

   i. Owners or operators of landfill gas-fired stationary spark ignition internal combustion engines that are manufactured after July 1, 2008, that must comply with the emission standards specified in 40 CFR §60.4233(e), shall comply with these standards by purchasing an engine certified to the emission standards in 40 CFR §60.4231(a) through (c), as applicable, for the same engine class and maximum engine power. Engines shall also meet the requirements as specified in 40 CFR Part 1068, Subparts A through D, as they apply.

      (A) If owners or operators adjust engine settings according to and consistent with the manufacturer's instructions, the stationary SI internal combustion engine will not be considered out of compliance. In addition, the engines shall meet the following requirement.

      (B) If owners or operators operate and maintain the certified landfill gas-fired stationary spark ignition internal combustion engine and control device (if required) according to the manufacturer's emission-related written instructions, they shall keep records of conducted maintenance to demonstrate compliance, but no performance testing is required if they are an owner or operator.

iii. **Recordkeeping/Reporting** [15A NCAC 2Q .0508(f)]
Owners and operators of all stationary spark ignition internal combustion engines shall keep records of:

(A) All notifications submitted to comply with this subpart and all documentation supporting any notification.

(B) Maintenance conducted on the engine.

(C) If the stationary SI internal combustion engine is a certified engine, documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR parts 90, 1048, 1054, and 1060, as applicable.

State Enforceable Only

4. **15A NCAC 2D .1806: CONTROL AND PROHIBITION OF ODOROUS EMISSIONS**
The Permittee shall not operate the facility without implementing management practices or installing and operating odor control equipment sufficient to prevent odorous emissions from the facility from causing or contributing to objectionable odors beyond the facility's boundary.

5. **15A NCAC 2D .1111, 40 CFR Part 63, Subpart ZZZZ "National Emission Standards For Hazardous Air Pollutants For "New" Stationary Reciprocating Internal Combustion Engines (RICE) Located At An Area Source of Hazardous Air Pollutants (HAPs)**

- ES-Gen-1 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-2 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-3 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-4 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-5 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-6 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-7 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-8 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)

Emission Limitations/Testing/Monitoring/Reporting/Recordkeeping

a. Owners and operators of a new stationary RICE located at area sources of HAP emissions shall meet the requirements of the final spark ignition (SI) NSPS (40 CFR part 60, Subpart JJJJ), as appropriate.
   i. Compliance with 40 CFR Part 60, Subpart JJJJ meets the compliance requirements of 40 CFR Part 63, Subpart ZZZZ, for a new SI RICE located at an area source of HAP emissions. [40 CFR §63.6590(c)]

b. Area sources of HAP emissions that become major sources.
If an area source increases its emissions or its potential to emit such that it becomes a major source of HAP as defined in 40 CFR §63.2, the compliance dates are as follows:
   i. Any stationary RICE for which construction or reconstruction is commenced after the date when an area source becomes a major source of HAP, the IC RICE must be in compliance with 40 CFR Part 63, Subpart ZZZZ upon startup of the affected source.
   ii. Any stationary RICE for which construction or reconstruction is commenced before the area source becomes a major source of HAP must be in compliance with 40 CFR Part 63, Subpart ZZZZ within 3 years after the area source becomes a major source of HAP.
   iii. Owning or operating an affected source requires that the applicable notification requirements in 40 CFR §63.6645 and in 40 CFR Part 63, Subpart A are met.

6. **15A NCAC 2D .0530 "Prevention of Significant Deterioration (PSD)"**
To comply with the best available control technology (BACT) determination pursuant to 15A NCAC 2D .0530, "Prevention of Significant Deterioration", criteria pollutant emissions shall be controlled from the eight genset units (ID Nos. ES-Gen-1, Gen-2, Gen-3, Gen-4, Gen-5, Gen-6, Gen-7, and Gen-8, 2233 HP each) such that emissions shall not exceed:

a. **Best Available Control Technology (BACT)**
   i. BACT for carbon monoxide (CO) from each genset unit shall be good combustion practices and 13.54 lbs CO/hour (2.75 g/Hp-hour).
   ii. BACT for nitrogen oxides (NOx) from each genset unit shall be good combustion practices and 2.46 lbs NOx/hour (0.50 g/Hp-hour).
   iii. BACT for PM10 from each genset unit shall be good combustion practices and 0.74 lbs PM10/hour (0.15 g/hp-hour).
   iv. BACT for PM2.5 from each genset unit shall be good combustion practices and 0.74 lbs PM2.5/hour (0.15 g/hp-hour).

Testing

b. If emissions testing is required, the Permittee shall perform such testing in accordance with 15A NCAC 2D .2600 and follow the procedures outlined below:
   i. The Permittee shall submit a completed Protocol Submittal Form to the DAQ Regional Supervisor at least 45 days prior to the scheduled test date. A copy of the Protocol Submittal Form may be obtained from the Regional Supervisor.
   ii. The Permittee shall notify the Regional Supervisor of the specific test dates at least 15 days prior to testing in order to afford the DAQ the opportunity to have an observer on-site during the sampling program.
   iii. During all sampling periods, the Permittee shall operate the emission source(s) under maximum normal operating conditions or alternative operating conditions as deemed appropriate by the Regional Supervisor or his delegate.
   iv. The Permittee shall submit two copies of the test report to the DAQ. The test report shall contain at a minimum the following information:
      (A) a description of the training and air testing experience of the person directing the test;
      (B) a certification of the test results by sampling team leader and facility representative;
      (C) a summary of emissions results and text detailing the objectives of the testing program, the applicable state and federal regulations, and conclusions about the testing and compliance status of the emission source(s);
      (D) a detailed description of the tested emission source(s) and sampling location(s) process flow diagrams, engineering drawings, and sampling location schematics should be included as necessary;
      (E) all field, analytical, and calibration data necessary to verify that the testing was performed as specified in the applicable test methods;
      (F) example calculations for at least one test run using equations in the applicable test methods and all test results including intermediate parameter calculations; and
      (G) documentation of facility operating conditions during all testing periods and an explanation relating these operating conditions to maximum normal operation. If necessary, provide historical process data to verify maximum normal operation.
   v. The testing requirement(s) shall be considered satisfied only upon written approval of the test results by the DAQ.
   vi. The DAQ will review emission test results with respect exclusively to the specified testing objectives as proposed by the Permittee and approved by the DAQ.

c. **PSD Performance Testing** - As required by 15A NCAC 2D .0530, the following performance tests shall be conducted. Compliance with this emission limit will be determined by an initial performance test within 60 to 180 days after normal operation testing for the "lbs per hour" of each pollutant as a surrogate for the g/hp-hour limit for each pollutant.

Affected Sources	Pollutant	Test Method
ES-Gen-01	Carbon Monoxide (CO) = 13.54 lbs/hour each genset Nitrogen Oxide (NOx) = 2.46 lbs/hour each genset PM_{10} = 0.74 lbs/hour each genset $PM_{2.5}$ = 0.74 lbs/hour each genset	As determined by DAQ approved testing protocol
ES-Gen-02		
ES-Gen-03		
ES-Gen-04		
ES-Gen-05		
ES-Gen-06		
ES-Gen-07		
ES-Gen-08		

i. The performance test shall be conducted using the test method specified in the table above in accordance with EPA Reference Methods, contained in 40 CFR Part 60, Appendix A. Use of an alternate test method must be approved in advance by the Division of Air Quality, and must be based on a test protocol that documents the alternate method is at least as accurate as the specified method. The EPA Administrator retains the exclusive right to approve equivalent and alternative test methods, continuous monitoring procedures, and reporting requirements.

ii. Within 60 days after achieving the maximum production rate at which the genset units will be operated, but not later than 180 days after the initial start-up of the units, the Permittee shall conduct the required performance testing on the landfill gas-fired genset units and shall begin the required monitoring.

iii. The number of runs and time required for each run for the performance test shall be in accordance with the approved testing protocol. The ambient temperature for each test run shall be above zero degree F. If the Permittee adjusts engine settings according to and consistent with the manufacturer's instructions, the testing of one of the identical engines is sufficient. The performance test load conditions shall be as close to peak load as practically possible.

iv. All associated testing costs are the responsibility of the Permittee. At least 45 days prior to performing any required emissions testing, the Permittee must submit two copies of a testing protocol to the DAQ Regional Supervisor, for review and approval. All testing protocols must be approved by the DAQ prior to performing tests.

v. To afford the DAQ Regional Supervisor the opportunity to have an observer present, the Permittee shall provide the Regional Office, in Writing, at least 15 days notice of any required performance test(s).

vi. The Permittee shall submit two copies of a written report of the results of each performance test, postmarked no later than 60 days following the completion of the test, to the Regional Supervisor, DAQ.

vii. The Division of Air Quality retains the right to require additional performance testing for the genset units if the results of the stack tests show a small margin of compliance with a PM_{10}/$PM_{2.5}$, CO, or NOx emission limit.

d. **PSD Monitoring:**

If the Permittee adjusts engine settings according to and consistent with the manufacturer's instructions, the stationary spark ignition internal combustion engine will not be considered out of compliance. If the Permittee operates and maintains the certified landfill gas-fired stationary spark ignition internal combustion engine according to the manufacturer's emission-related written instructions, they shall keep records of conducted maintenance to demonstrate compliance.

e. **Recordkeeping/Reporting** [15A NCAC 2Q .0508(f)]
Owners and operators of all stationary spark ignition internal combustion engines shall keep records of:
i. All notifications submitted to comply with this regulation and all documentation supporting any notifications.
ii. Maintenance conducted on the engine.
iii. Documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR Parts 90, 1048, 1054, and 1060, as applicable.

2.2- MULTIPLE EMISSION SOURCES SPECIFIC LIMITATATIONS AND CONDITIONS

A. **Source Descriptions:**

- ES-1 (Municipal solid waste landfill) with associated control devices (CD-1, CD-2, and CD-3)
- ES-Gen-1 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-2 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-3 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-4 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-5 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-6 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-7 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)
- ES-Gen-8 (Landfill gas-fired genset unit, lean burn, 1600 kW, 2233 Hp output)

"State-Enforceable Only"

I. **15A NCAC 2Q .0705 "Existing Facilities And SIC Calls", 15A NCAC 2D .1100 "Control Of Toxic Air Pollutants"**

Toxic Air Pollutant Emissions Limitation And Requirements - Pursuant to 15A NCAC 2Q .0705 and in accordance with the approved application for an air toxic compliance demonstration, the following permit limits **shall not be exceeded** in accordance with 15A NCAC 2D .1100:

Emission Sources	Toxic Air Pollutants	Emission Limits (Modeled Rates)	Emission Limits (Modeled Rates)	Emission Limits (Modeled Rates)
Municipal solid waste landfill (ES-1)	1,1,2,2-Tetrachloroethane	523.848 lbs/year	----------	----------
	Ethylene dichloride	315,360 lbs/year	----------	----------
	Acrylonitrile	12,439 lbs/yr	----------	----------
	Benzene	9,989 lbs/yr	----------	----------
	Dichlorofluoromethane	----------	22.752 lbs/day	----------
	Methylene chloride	1,997,280 lbs/yr	----------	----------
	Ethyl mercaptan	----------	----------	75.9 lbs/hour
	Hexane	----------	50,088 lbs/day	----------
	Methyl mercaptan	----------	----------	37.9 lbs/hour
	Vinyl chloride	31,536 lbs/yr	----------	----------
	Hydrogen sulfide	----------	5,472 lbs/day	----------
	Toluene	----------	213,960 lbs/day	----------
	Trichloroethylene	4,905,600 lbs/yr	----------	----------
	Xylene	----------	122,928 lbs/day	5,122 lbs/hour
Municipal solid waste landfill (ES-1) and ES-Gen-1 through ES-Gen-8	Hydrogen chloride	----------	----------	238 lbs/hour

"State-Enforceable Only"

2. **15A NCAC 2Q .0711 "Emission Rates Requiring A Permit"**
TOXIC AIR POLLUTANT EMISSIONS LIMITATION REQUIREMENT – Pursuant to 15A NCAC 2Q .0705, Sampson County Disposal, LLC (ID No. ES-1), shall be operated and maintained in such a manner that emissions of any listed toxic air pollutants from the facility, including fugitive emissions, will not exceed the "Emission Rates Requiring A Permit" specified in 15A NCAC 2Q .0711. In accordance with the approved application, the Permittee shall maintain records of operational information demonstrating that the toxic air pollutant emissions do not exceed the emission rates as listed below. In the event one (1) or more of these thresholds are exceeded, compliance with 15A NCAC 2D. 1100 shall be demonstrated.

Pollutant (CAS Number)	Threshold (lbs/yr)	Threshold (lbs/day)	Threshold (lbs/hr)
1,1,1-Trichloroethane (Methyl chloroform)	----------	250	64
1,1-Dichloroethene (Vinylidene chloride)	----------	2.5	----------
Carbon disulfide	----------	3.9	----------
Carbon tetrachloride	460	----------	----------
Chlorobenzene	----------	46	----------
Chloroform	290	----------	----------
p-Dichlorobenzene	----------	----------	16.8
Dichlorodifluoromethane	----------	5200	----------
Ethylene dibromide	27	----------	----------
Mercury	----------	0.013	----------
Methyl ethyl ketone	----------	78	22.4
Methyl isobutyl ketone	----------	52	7.6
Perchloroethylene (Tetrachloroethene)	13000	----------	----------
Trichlorofluoromethane	----------	----------	140

SECTION 3 - GENERAL CONDITIONS (version 3.1)

This section describes terms and conditions applicable to this Title V facility.

A. **General Provisions** [NCGS 143-215 and 15A NCAC 2Q .0508(i)(16)]

1. Terms not otherwise defined in this permit shall have the meaning assigned to such terms as defined in 15A NCAC 2D and 2Q.
2. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are binding and enforceable pursuant to NCGS 143-215.114A and 143-215.114B, including assessment of civil and/or criminal penalties. Any unauthorized deviation from the conditions of this permit may constitute grounds for revocation and/or enforcement action by the DAQ.
3. This permit is not a waiver of or approval of any other Department permits that may be required for other aspects of the facility which are not addressed in this permit.
4. This permit does not relieve the Permittee from liability for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this permitted facility, or from penalties therefore, nor does it allow the Permittee to cause pollution in contravention of state laws or rules, unless specifically authorized by an order from the North Carolina Environmental Management Commission.
5. Except as identified as state-only requirements in this permit, all terms and conditions contained herein shall be enforceable by the DAQ, the EPA, and citizens of the United States as defined in the Federal Clean Air Act.
6. Any stationary source of air pollution shall not be operated, maintained, or modified without the appropriate and valid permits issued by the DAQ, unless the source is exempted by rule. The DAQ may issue a permit only after it receives reasonable assurance that the installation will not cause air pollution in violation of any of the applicable requirements. A permitted installation may only be operated, maintained, constructed, expanded, or modified in a manner that is consistent with the terms of this permit.

B. **Permit Availability** [15A NCAC 2Q .0507(k) and .0508(i)(9)(B)]

The Permittee shall have available at the facility a copy of this permit and shall retain for the duration of the permit term one complete copy of the application and any information submitted in support of the application package. The permit and application shall be made available to an authorized representative of Department of Environment and Natural Resources upon request.

C. **Severability Clause** [15A NCAC 2Q .0508(i)(2)]

In the event of an administrative challenge to a final and binding permit in which a condition is held to be invalid, the provisions in this permit are severable so that all requirements contained in the permit, except those held to be invalid, shall remain valid and must be complied with.

D. **Submissions** [15A NCAC 2Q .0507(e) and 2Q .0508(i)(16)]

Except as otherwise specified herein, two copies of all documents, reports, test data, monitoring data, notifications, request for renewal, and any other information required by this permit shall be submitted to the appropriate Regional Office. Refer to the Regional Office address on the cover page of this permit. For continuous emissions monitoring systems (CEMS) reports, continuous opacity monitoring systems (COMS) reports, quality assurance (QA)/quality control (QC) reports, acid rain CEM certification reports, and NOx budget CEM certification reports, one copy shall be sent to the appropriate Regional Office and one copy shall be sent to:

Supervisor, Stationary Source Compliance
North Carolina Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641

All submittals shall include the facility name and Facility ID number (refer to the cover page of this permit).

E. **Duty to Comply** [15A NCAC 2Q .0508(i)(2)]
The Permittee shall comply with all terms, conditions, requirements, limitations and restrictions set forth in this permit. Noncompliance with any permit condition except conditions identified as state-only requirements constitutes a violation of the Federal Clean Air Act. Noncompliance with any permit condition is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

F. **Circumvention** - STATE ENFORCEABLE ONLY
The facility shall be properly operated and maintained at all times in a manner that will effect an overall reduction in air pollution. Unless otherwise specified by this permit, no emission source may be operated without the concurrent operation of its associated air pollution control device(s) and appurtenances.

G. **Permit Modifications**

1. Administrative Permit Amendments [15A NCAC 2Q .0514]
   The Permittee shall submit an application for an administrative permit amendment in accordance with 15A NCAC 2Q .0514.
2. Transfer in Ownership or Operation and Application Submittal Content [15A NCAC 2Q .0524 and 2Q .0505]
   The Permittee shall submit an application for an ownership change in accordance with 15A NCAC 2Q.0524 and 2Q .0505.
3. Minor Permit Modifications [15A NCAC 2Q .0515]
   The Permittee shall submit an application for a minor permit modification in accordance with 15A NCAC 2Q .0515.
4. Significant Permit Modifications [15A NCAC 2Q .0516]
   The Permittee shall submit an application for a significant permit modification in accordance with 15A NCAC 2Q .0516.
5. Reopening for Cause [15A NCAC 2Q .0517]
   The Permittee shall submit an application for reopening for cause in accordance with 15A NCAC 2Q .0517.

H. **Changes Not Requiring Permit Modifications**

1. Reporting Requirements
   Any of the following that would result in new or increased emissions from the emission source(s) listed in Section 1 must be reported to the Regional Supervisor, DAQ:
   a. changes in the information submitted in the application;
   b. changes that modify equipment or processes; or
   c. changes in the quantity or quality of materials processed.

   If appropriate, modifications to the permit may then be made by the DAQ to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause a violation of the emission limitations specified herein.

2. Section 502(b)(10) Changes [15A NCAC 2Q .0523(a)]
   a. "Section 502(b)(10) changes" means changes that contravene an express permit term or condition. Such changes do not include changes that would violate applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring (including test methods), recordkeeping, reporting, or compliance certification requirements.
   b. The Permittee may make Section 502(b)(10) changes without having the permit revised if:
      i. the changes are not a modification under Title I of the Federal Clean Air Act;
      ii. the changes do not cause the allowable emissions under the permit to be exceeded;
      iii. the Permittee notifies the Director and EPA with written notification at least seven days before the change is made; and
      iv. the Permittee shall attach the notice to the relevant permit.

c. The written notification shall include:
   i. a description of the change;
   ii. the date on which the change will occur;
   iii. any change in emissions; and
   iv. any permit term or condition that is no longer applicable as a result of the change.
d. Section 502(b)(10) changes shall be made in the permit the next time that the permit is revised or renewed, whichever comes first.

3. Off Permit Changes [15A NCAC 2Q .0523(b)]
   The Permittee may make changes in the operation or emissions without revising the permit if:
   a. the change affects only insignificant activities and the activities remain insignificant after the change; or
   b. the change is not covered under any applicable requirement.
4. Emissions Trading [15A NCAC 2Q .0523(c)]
   To the extent that emissions trading is allowed under 15A NCAC 2D, including subsequently adopted maximum achievable control technology standards, emissions trading shall be allowed without permit revision pursuant to 15A NCAC 2Q .0523(c).

I.A. **Reporting Requirements for Excess Emissions and Permit Deviations**
[15A NCAC 2D .0535(f) and 2Q .0508(f)(2)]
"Excess Emissions" - means an emission rate that exceeds any applicable emission limitation or standard allowed by any rule in Sections .0500, .0900, .1200, or .1400 of Subchapter 2D; or by a permit condition; or that exceeds an emission limit established in a permit issued under 15A NCAC 2Q .0700. *(Note: Definitions of excess emissions under 2D .1110 and 2D .1111 shall apply where defined by rule.)*
"Deviations" - for the purposes of this condition, any action or condition not in accordance with the terms and conditions of this permit including those attributable to upset conditions as well as excess emissions as defined above lasting less than four hours.

Excess Emissions

1. If a source is required to report excess emissions under NSPS (15A NCAC 2D .0524), NESHAPS (15A NCAC 2D .1110 or .1111), or the operating permit provides for periodic (e.g., quarterly) reporting of excess emissions, reporting shall be performed as prescribed therein.
2. If the source is not subject to NSPS (15A NCAC 2D .0524), NESHAPS (15A NCAC 2D .1110 or .1111), or these rules do NOT define "excess emissions," the Permittee shall report excess emissions in accordance with 15A NCAC 2D .0535 as follows:
   a. Pursuant to 15A NCAC 2D .0535, if excess emissions last for more than four hours resulting from a malfunction, a breakdown of process or control equipment, or any other abnormal condition, the owner or operator shall:
      i. notify the Regional Supervisor or Director of any such occurrence by 9:00 a.m. Eastern Time of the Division's next business day of becoming aware of the occurrence and provide:
         - name and location of the facility;
         - nature and cause of the malfunction or breakdown;
         - time when the malfunction or breakdown is first observed;
         - expected duration; and
         - estimated rate of emissions;
      ii. notify the Regional Supervisor or Director immediately when corrective measures have been accomplished; and
      iii. submit to the Regional Supervisor or Director within 15 days a written report as described in 15A NCAC 2D .0535(f)(3).

Permit Deviations

3. Pursuant to 15A NCAC 2Q .0508(f)(2), the Permittee shall report deviations from permit requirements (terms and conditions) as follows:
   a. Notify the Regional Supervisor or Director of all other deviations from permit requirements not covered under 15A NCAC 2D .0535 quarterly. A written report to the Regional Supervisor shall include the probable cause of such deviation and any corrective actions or preventative actions taken. The responsible official shall certify all deviations from permit requirements.

I.B. **Other Requirements under 15A NCAC 2D .0535**

The Permittee shall comply with all other applicable requirements contained in 15A NCAC 2D .0535, including 15A NCAC 2D .0535(c) as follows:

1. Any excess emissions that do not occur during start-up and shut-down shall be considered a violation of the appropriate rule unless the owner or operator of the sources demonstrates to the Director, that the excess emissions are a result of a malfunction. The Director shall consider, along with any other pertinent information, the criteria contained in 15A NCAC 2D .0535(c)(1) through (7).
2. 15A NCAC 2D .0535(g). Excess emissions during start-up and shut-down shall be considered a violation of the appropriate rule if the owner or operator cannot demonstrate that excess emissions are unavoidable.

J. **Emergency Provisions** [40 CFR 70.6(g)]

The Permittee shall be subject to the following provisions with respect to emergencies:

1. An emergency means any situation arising from sudden and reasonably unforeseeable events beyond the control of the facility, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the facility to exceed a technology-based emission limitation under the permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventive maintenance, careless or improper operation, or operator error.
2. An emergency constitutes an affirmative defense to an action brought for noncompliance with such technology-based emission limitations if the conditions specified in 3. below are met.
3. The affirmative defense of emergency shall be demonstrated through properly signed contemporaneous operating logs or other relevant evidence that include information as follows:
   a. an emergency occurred and the Permittee can identify the cause(s) of the emergency;
   b. the permitted facility was at the time being properly operated;
   c. during the period of the emergency the Permittee took all reasonable steps to minimize levels of emissions that exceeded the standards or other requirements in the permit; and
   d. the Permittee submitted notice of the emergency to the DAQ within two working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, steps taken to mitigate emissions, and corrective actions taken.
4. In any enforcement proceeding, the Permittee seeking to establish the occurrence of an emergency has the burden of proof.
5. This provision is in addition to any emergency or upset provision contained in any applicable requirement specified elsewhere herein.

K. **Permit Renewal** [15A NCAC 2Q .0508(e) and 2Q .0513(b)]

This permit is issued for a fixed term of five years for facilities subject to Title IV requirements and for a term not to exceed five years in the case of all other facilities. This permit shall expire at the end of its term. Permit expiration terminates the facility's right to operate unless a complete renewal application is submitted at least nine months before the date of permit expiration. If the Permittee or applicant has complied with 15A NCAC 2Q .0512(b)(1), this permit shall not expire until the renewal permit has been issued or denied. All terms and conditions of this permit shall remain in effect until the renewal permit has been issued or denied.

L. **Need to Halt or Reduce Activity Not a Defense** [15A NCAC 2Q .0508(i)(4)]

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

M. **Duty to Provide Information (submittal of information)** [15A NCAC 2Q .0508(i)(9)]

1. The Permittee shall furnish to the DAQ, in a timely manner, any reasonable information that the Director may request in **writing** to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit.
2. The Permittee shall furnish the DAQ copies of records required to be kept by the permit when such copies are requested by the Director. For information claimed to be confidential, the Permittee may furnish such records directly to the EPA upon request along with a claim of confidentiality.

N. **Duty to Supplement** [15A NCAC 2Q .0507(f)]
The Permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information to the DAQ. The Permittee shall also provide additional information as necessary to address any requirement that becomes applicable to the facility after the date a complete permit application was submitted but prior to the release of the draft permit.

O. **Retention of Records** [15A NCAC 2Q .0508(f) and 2Q .0508 (l)]
The Permittee shall retain records of all required monitoring data and supporting information for a period of at least five years from the date of the monitoring sample, measurement, report, or application. Supporting information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring information, and copies of all reports required by the permit. These records shall be maintained in a form suitable and readily available for expeditious inspection and review. Any records required by the conditions of this permit shall be kept on site and made available to DAQ personnel for inspection upon request.

P. **Compliance Certification** [15A NCAC 2Q .0508(n)]
The Permittee shall submit to the DAQ and the EPA (Air and EPCRA Enforcement Branch, EPA, Region 4, 61 Forsyth Street, Atlanta, GA 30303) postmarked on or before March 1 a compliance certification (for the preceding calendar year) by a responsible official with all federally-enforceable terms and conditions in the permit, including emissions limitations, standards, or work practices. It shall be the responsibility of the current owner to submit a compliance certification for the entire year regardless of who owned the facility during the year. The compliance certification shall comply with additional requirements as may be specified under Sections 114(a)(3) or 504(b) of the Federal Clean Air Act. The compliance certification shall specify:
1. the identification of each term or condition of the permit that is the basis of the certification;
2. the compliance status (with the terms and conditions of the permit for the period covered by the certification);
3. whether compliance was continuous or intermittent; and
4. the method(s) used for determining the compliance status of the source during the certification period.

Q. **Certification by Responsible Official** [15A NCAC 2Q .0520]
A responsible official shall certify the truth, accuracy, and completeness of any application form, report, or compliance certification required by this permit. All certifications shall state that based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

R. **Permit Shield for Applicable Requirements** [15A NCAC 2Q .0512]
1. Compliance with the terms and conditions of this permit shall be deemed compliance with applicable requirements, where such applicable requirements are included and specifically identified in the permit as of the date of permit issuance.
2. A permit shield shall not alter or affect:
   a. the power of the Commission, Secretary of the Department, or Governor under NCGS 143-215.3(a)(12), or EPA under Section 303 of the Federal Clean Air Act;
   b. the liability of an owner or operator of a facility for any violation of applicable requirements prior to the effective date of the permit or at the time of permit issuance;
   c. the applicable requirements under Title IV; or
   d. the ability of the Director or the EPA under Section 114 of the Federal Clean Air Act to obtain information to determine compliance of the facility with its permit.
3. A permit shield does not apply to any change made at a facility that does not require a permit or permit revision made under 15A NCAC 2Q .0523.
4. A permit shield does not extend to minor permit modifications made under 15A NCAC 2Q .0515.

S. **Termination, Modification, and Revocation of the Permit** [15A NCAC 2Q .0519]
The Director may terminate, modify, or revoke and reissue this permit if:
1. the information contained in the application or presented in support thereof is determined to be incorrect;
2. the conditions under which the permit or permit renewal was granted have changed;
3. violations of conditions contained in the permit have occurred;
4. the EPA requests that the permit be revoked under 40 CFR 70.7(g) or 70.8(d); or
5. the Director finds that termination, modification, or revocation and reissuance of the permit is necessary to carry out the purpose of NCGS Chapter 143, Article 21B.

T. **Insignificant Activities** [15A NCAC 2Q .0503]
Because an emission source or activity is insignificant does not mean that the emission source or activity is exempted from any applicable requirement or that the owner or operator of the source is exempted from demonstrating compliance with any applicable requirement. The Permittee shall have available at the facility at all times and made available to an authorized representative upon request, documentation, including calculations, if necessary, to demonstrate that an emission source or activity is insignificant.

U. **Property Rights** [15A NCAC 2Q .0508(i)(8)]
This permit does not convey any property rights in either real or personal property or any exclusive privileges.

V. **Inspection and Entry** [15A NCAC 2Q .0508(l) and NCGS 143-215.3(a)(2)]
1. Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow the DAQ, or an authorized representative, to perform the following:
   a. enter the Permittee's premises where the permitted facility is located or emissions-related activity is conducted, or where records are kept under the conditions of the permit;
   b. have access to and copy, at reasonable times, any records that are required to be kept under the conditions of the permit;
   c. inspect at reasonable times and using reasonable safety practices any source, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under the permit; and
   d. sample or monitor substances or parameters, using reasonable safety practices, for the purpose of assuring compliance with the permit or applicable requirements at reasonable times.

   Nothing in this condition shall limit the ability of the EPA to inspect or enter the premises of the Permittee under Section 114 or other provisions of the Federal Clean Air Act.
2. No person shall refuse entry or access to any authorized representative of the DAQ who requests entry for purposes of inspection, and who presents appropriate credentials, nor shall any person obstruct, hamper, or interfere with any such authorized representative while in the process of carrying out his official duties. Refusal of entry or access may constitute grounds for permit revocation and assessment of civil penalties.

W. **Annual Fee Payment** [15A NCAC 2Q .0508(i)(10)]
1. The Permittee shall pay all fees in accordance with 15A NCAC 2Q .0200.
2. Payment of fees may be by check or money order made payable to the N.C. Department of Environment and Natural Resources. Annual permit fee payments shall refer to the permit number.
3. If, within 30 days after being billed, the Permittee fails to pay an annual fee, the Director may initiate action to terminate the permit under 15A NCAC 2Q .0519.

X. **Annual Emission Inventory Requirements** [15A NCAC 2Q .0207]
The Permittee shall report by **June 30 of each year** the actual emissions of each air pollutant listed in 15A NCAC 2Q .0207(a) from each emission source within the facility during the previous calendar year. The report shall be in or on such form as may be established by the Director. The accuracy of the report shall be certified by a responsible official of the facility.

Y. **Confidential Information** [15A NCAC 2Q .0107 and 2Q. 0508(i)(9)]
Whenever the Permittee submits information under a claim of confidentiality pursuant to 15A NCAC 2Q .0107, the Permittee may also submit a copy of all such information and claim directly to the EPA upon request. All requests for confidentiality must be in accordance with 15A NCAC 2Q .0107.

Z. **Construction and Operation Permits** [15A NCAC 2Q .0100 and .0300]
A construction and operating permit shall be obtained by the Permittee for any proposed new or modified facility or emission source which is not exempted from having a permit prior to the beginning of construction or modification, in accordance with all applicable provisions of 15A NCAC 2Q .0100 and .0300.

AA. **Standard Application Form and Required Information** [15A NCAC 2Q .0505 and .0507]
The Permittee shall submit applications and required information in accordance with the provisions of 15A NCAC 2Q .0505 and .0507.

BB. **Financial Responsibility and Compliance History** [15A NCAC 2Q .0507(d)(4)]
The DAQ may require an applicant to submit a statement of financial qualifications and/or a statement of substantial compliance history.

CC. **Refrigerant Requirements (Stratospheric Ozone and Climate Protection)** [15A NCAC 2Q .0501(e)]
1. If the Permittee has appliances or refrigeration equipment, including air conditioning equipment, which use Class I or II ozone-depleting substances such as chlorofluorocarbons and hydrochlorofluorocarbons listed as refrigerants in 40 CFR Part 82 Subpart A Appendices A and B, the Permittee shall service, repair, and maintain such equipment according to the work practices, personnel certification requirements, and certified recycling and recovery equipment specified in 40 CFR Part 82 Subpart F.
2. The Permittee shall not knowingly vent or otherwise release any Class I or II substance into the environment during the repair, servicing, maintenance, or disposal of any such device except as provided in 40 CFR Part 82 Subpart F.
3. The Permittee shall comply with all reporting and recordkeeping requirements of 40 CFR 82.166. Reports shall be submitted to the EPA or its designee as required.

DD. **Prevention of Accidental Releases - Section 112(r)** [15A NCAC 2Q .0508(h)]
If the Permittee is required to develop and register a Risk Management Plan with EPA pursuant to Section 112(r) of the Clean Air Act, then the Permittee is required to register this plan in accordance with 40 CFR Part 68.

EE. **Prevention of Accidental Releases General Duty Clause - Section 112(r)(1)** -
FEDERALLY-ENFORCEABLE ONLY
Although a risk management plan may not be required, if the Permittee produces, processes, handles, or stores any amount of a listed hazardous substance, the Permittee has a general duty to take such steps as are necessary to prevent the accidental release of such substance and to minimize the consequences of any release.

FF. **Title IV Allowances** [15A NCAC 2Q .0508(i)(1)]
This permit does not limit the number of Title IV allowances held by the Permittee, but the Permittee may not use allowances as a defense to noncompliance with any other applicable requirement. The Permittee's emissions may not exceed any allowances that the facility lawfully holds under Title IV of the Federal Clean Air Act.

GG. **Air Pollution Emergency Episode** [15A NCAC 2D .0300]
Should the Director of the DAQ declare an Air Pollution Emergency Episode, the Permittee will be required to operate in accordance with the Permittee's previously approved Emission Reduction Plan or, in the absence of an approved plan, with the appropriate requirements specified in 15A NCAC 2D .0300.

HH. **Registration of Air Pollution Sources** [15A NCAC 2D .0200]
The Director of the DAQ may require the Permittee to register a source of air pollution. If the Permittee is required to register a source of air pollution, this registration and required information will be in accordance with 15A NCAC 2D .0202(b).

II. **Ambient Air Quality Standards** [15A NCAC 2D .0501(c)]
In addition to any control or manner of operation necessary to meet emission standards specified in this permit, any source of air pollution shall be operated with such control or in such manner that the source shall not cause the ambient air quality standards in 15A NCAC 2D .0400 to be exceeded at any point beyond the premises on which the source is located. When controls more stringent than named in the applicable emission standards in this permit are required to prevent violation of the ambient air quality standards or are required to create an offset, the permit shall contain a condition requiring these controls.

JJ. **General Emissions Testing and Reporting Requirements** [15A NCAC 2Q .0508(i)(16)]
If emissions testing is required by this permit or the DAQ or if the Permittee submits emissions testing to the DAQ in support of a permit application or to demonstrate compliance, the Permittee shall perform such testing in accordance with 15A NCAC 2D .2600 and follow the procedures outlined below:

1. The Permittee shall submit a completed Protocol Submittal Form to the DAQ Regional Supervisor at least 45 days prior to the scheduled test date. A copy of the Protocol Submittal Form may be obtained from the Regional Supervisor.
2. The Permittee shall notify the Regional Supervisor of the specific test dates at least 15 days prior to testing in order to afford the DAQ the opportunity to have an observer on-site during the sampling program.
3. During all sampling periods, the Permittee shall operate the emission source(s) under maximum normal operating conditions or alternative operating conditions as deemed appropriate by the Regional Supervisor or his delegate.
4. The Permittee shall submit **two** copies of the test report to the DAQ. The test report shall contain at a minimum the following information:
    a. a description of the training and air testing experience of the person directing the test;
    b. a certification of the test results by sampling team leader and facility representative;
    c a summary of emissions results and text detailing the objectives of the testing program, the applicable state and federal regulations, and conclusions about the testing and compliance status of the emission source(s);
    d. a detailed description of the tested emission source(s) and sampling location(s) process flow diagrams, engineering drawings, and sampling location schematics should be included as necessary;
    e. all field, analytical, and calibration data necessary to verify that the testing was performed as specified in the applicable test methods;
    f. example calculations for at least one test run using equations in the applicable test methods and all test results including intermediate parameter calculations; and
    g. documentation of facility operating conditions during all testing periods and an explanation relating these operating conditions to maximum normal operation. If necessary, provide historical process data to verify maximum normal operation.
5. The testing requirement(s) shall be considered satisfied only upon written approval of the test results by the DAQ.
6. The DAQ will review emission test results with respect exclusively to the specified testing objectives as proposed by the Permittee and approved by the DAQ.

KK. **Reopening for Cause** [15A NCAC 2Q .0517]

1. A permit shall be reopened and revised under the following circumstances:
    a. additional applicable requirements become applicable to a facility with remaining permit term of three or more years;
    b. additional requirements (including excess emission requirements) become applicable to a source covered by Title IV;
    c. the Director or EPA finds that the permit contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the permit; or
    d. the Director or EPA determines that the permit must be revised or revoked to assure compliance with the applicable requirements.

2. Any permit reopening shall be completed or a revised permit issued within 18 months after the applicable requirement is promulgated. No reopening is required if the effective date of the requirement is after the expiration of the permit term unless the term of the permit was extended pursuant to 15A NCAC 2Q .0513(c).
3. Except for the state-enforceable only portion of the permit, the procedures set out in 15A NCAC 2Q .0507, .0521, or .0522 shall be followed to reissue the permit. If the State-enforceable only portion of the permit is reopened, the procedures in 15A NCAC 2Q .0300 shall be followed. The proceedings shall affect only those parts of the permit for which cause to reopen exists.
4. The Director shall notify the Permittee at least 60 days in advance of the date that the permit is to be reopened, except in cases of imminent threat to public health or safety the notification period may be less than 60 days.
5. Within 90 days, or 180 days if the EPA extends the response period, after receiving notification from the EPA that a permit needs to be terminated, modified, or revoked and reissued, the Director shall send to the EPA a proposed determination of termination, modification, or revocation and reissuance, as appropriate.

LL. **Reporting Requirements for Non-Operating Equipment** [15A NCAC 2Q .0508(i)(16)]
The Permittee shall maintain a record of operation for permitted equipment noting whenever the equipment is taken from and placed into operation. During operation the monitoring recordkeeping and reporting requirements as prescribed by the permit shall be implemented within the monitoring period.

MM. **Fugitive Dust Control Requirement** [15A NCAC 2D .0540] - STATE ENFORCEABLE ONLY
As required by 15A NCAC 2D .0540 "Particulates from Fugitive Dust Emission Sources," the Permittee shall not cause or allow fugitive dust emissions to cause or contribute to substantive complaints or excess visible emissions beyond the property boundary. If substantive complaints or excessive fugitive dust emissions from the facility are observed beyond the property boundaries for six minutes in any one hour (using Reference Method 22 in 40 CFR, Appendix A), the owner or operator may be required to submit a fugitive dust plan as described in 2D .0540(f). "Fugitive dust emissions" means particulate matter from process operations that does not pass through a process stack or vent and that is generated within plant property boundaries from activities such as: unloading and loading areas, process areas stockpiles, stock pile working, plant parking lots, and plant roads (including access roads and haul roads).

NN. **Specific Permit Modifications** [15A NCAC 2Q.0501 and .0523]
1. For modifications made pursuant to 15A NCAC 2Q .0501(c)(2), the Permittee shall file a Title V Air Quality Permit Application for the air emission source(s) and associated air pollution control device(s) on or before 12 months after commencing operation.
2. For modifications made pursuant to 15A NCAC 2Q .0501(d)(2), the Permittee shall not begin operation of the air emission source(s) and associated air pollution control device(s) until a Title V Air Quality Permit Application is filed and a construction and operation permit following the procedures of Section .0500 (except for Rule .0504 of this Section) is obtained.
3. For modifications made pursuant to 502(b)(10), in accordance with 15A NCAC 2Q .0523(a)(1)(C), the Permittee shall notify the Director and EPA (EPA - Air Planning Branch, 61 Forsyth St., Atlanta, GA 30303) in writing at least seven days before the change is made. The written notification shall include:
   a. a description of the change at the facility;
   b. the date on which the change will occur;
   c. any change in emissions; and
   d. any permit term or condition that is no longer applicable as a result of the change.

   In addition to this notification requirement, with the next significant modification or Air Quality Permit renewal, the Permittee shall submit a page "E5" of the application forms signed by the responsible official verifying that the application for the 502(b)(10) change/modification, is true, accurate, and complete. Further note that modifications made pursuant to 502(b)(10) do not relieve the Permittee from satisfying preconstruction requirements.

OO. **Mandatory Greenhouse Gas Reporting Requirements** [15A NCAC 2Q .0508]
FEDERAL-ENFORCEABLE ONLY
If the Permittee is subject to requirements of 40 CFR 98.2(a), the Permittee shall submit all required reports to the EPA Administrator in accordance with 40 CFR 98.

ATTACHMENT

List of Acronyms

AOS	Alternate Operating Scenario
BACT	Best Available Control Technology
Btu	British thermal unit
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CEM	Continuous Emission Monitor
CFR	Code of Federal Regulations
CAA	Clean Air Act
DAQ	Division of Air Quality
DENR	Department of Environment and Natural Resources
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
FR	Federal Register
GACT	Generally Available Control Technology
HAP	Hazardous Air Pollutant
MACT	Maximum Achievable Control Technology
NAA	Non-Attainment Area
NCAC	North Carolina Administrative Code
NCGS	North Carolina General Statutes
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NO_X	Nitrogen Oxides
NSPS	New Source Performance Standard
OAH	Office of Administrative Hearings
PM	Particulate Matter
PM_{10}	Particulate Matter with Nominal Aerodynamic Diameter of 10 Micrometers or Less
POS	Primary Operating Scenario
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
tpy	Tons Per Year
VOC	Volatile Organic Compound

NORTH CAROLINA DIVISION OF AIR QUALITY **Air Permit Review – Final Review** Permit Issue Date: MAY 10, 2010	Region: Fayetteville Regional Office County: Sampson NC Facility ID: 8200139 Inspector's Name: Mitch Revels Date of Last Inspection: 09/08/2009 Compliance Code: 3 / Compliance - inspection
Facility Data Applicant (Facility's Name): Sampson County Disposal LLC Facility Address: Sampson County Disposal LLC 7434 Roseboro Hwy Roseboro, NC 28382 SIC: 4953 / Refuse Systems NAICS: 562212 / Solid Waste Landfill Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V	Permit Applicability (this application only) SIP: 15A NCAC 2D .0524, 2D .1111, 2D .0530 NSPS: Subpart IIII NESHAP: Subpart ZZZZ PSD: CO, NOx, PM/PM10/PM2.5 PSD Avoidance: N/A NC Toxics: HCL 112(r): N/A Other: N/A

Contact Data			Application Data
Facility Contact	Authorized Contact	Technical Contact	Application Number: 8200139.09A Date Received: 05/14/2009 Application Type: Modification Application Schedule: PSD
Bryan Wuester Landfill Manager (910) 525-4132 P.O. Box 640 Roseboro, NC 28382+0640 Bryan.wuester@wasteindustries.com	Bryan Wuester Landfill Manager (910) 525-4132 P.O. Box 640 Roseboro, NC 28382+0640 Bryan.wuester@wasteindustries.com	Bryan Wuester Landfill Manager (910) 525-4132 P.O. Box 640 Roseboro, NC 28382+0640 Bryan.wuester@wasteindustries.com	Existing Permit Data Existing Permit Number: 09431T01 Existing Permit Issue Date: 12/07/2005 Existing Permit Expiration Date: 08/31/2009

Consultant: RST Engineering, PLLC Contact: Butch Smith Phone#: (919) 810-9875 email: butch50@nc.rr.com

Review Engineer: Booker Pullen Regional Engineer: James Moser Review Engineer's Signature: Booker T. Pullen Review Start Date: September 9, 2009	**Comments / Recommendations:** Issue: 09431T02 Permit Issue Date: May 10, 2010 Permit Expiration Date: March 31, 2015 * * Note: the renewal application was received by the RCO on November 25, 2008.

BACKGROUND

Sampson County Disposal LLC is an existing permitted Title V Municipal Solid Waste facility. They are proposing to install eight 4-stroke, lean burn, 1,600 kW each, landfill gas-fired generators (gensets) for the combustion of collected landfill gas (LFG) and the generation of electricity that will be sold to the local utility company. One large backup candlestick-type flare (CD-2, 141 mmBtu/hr, 4700 cfm) and one smaller candlestick-type flare (CD-3, 21 mmBtu/hr, 700 cfm) will also be constructed with this project. The two flares associated with this modification will be used as control devices for the landfill and will not be included in this project as sources. Based on projected gas generation rates, the eight new genset units and the flares will be capable of handling all collected LFG anticipated from the landfill over the remaining active life of the landfill, prior to the closure of the landfill and installation of the final cap.

It is anticipated that the gensets will be the primary sources to burn the landfill gas after installation, with the existing flare and new backup flares as secondary control devices. The worse case scenario at this facility for potential emissions of all pollutants is the simultaneous operation of the eight generator units. A new landfill gas treatment system (CD-Treatment) will be added to the facility to comply with NSPS Subpart WWW, §60.752 (a)(b)(iii)(C) for the landfill. The landfill gas treatment system shall have a filtration rating of 10 microns or less, lower the water dew point of the landfill gas by at least 20 degrees Fahrenheit with a de-watering process, and compress the landfill gas.

{The genset units are not being used as control devices and do not have to meet the requirements of §60.752 (a)(b)(iii)(B) for the landfill because the landfill gas treatment system will be installed into the gas collection system prior to the gas being burned in the genset units}.

CHRONOLOGY

May 14, 2009	Sampson County Disposal LLC submitted to the North Carolina Division of Air Quality (NCDAQ) a Prevention of Significant Deterioration (PSD) permit application (8200139.09A) proposing to construct a landfill gas-to-energy project. The proposed project will install eight 4-stroke, lean burn, 1,600 kW each, landfill gas-fired generators (gensets) for the combustion of collected LFG and the generation of electricity that will be sold to the local utility company. Also, one large backup candlestick-type flare (CD-2, 141 mmBtu/hr, 4700 cfm) and one smaller candlestick-type flare (CD-3, 21 mmBtu/hr, 700 cfm) will also be constructed with this project. The two flares associated with this modification will be used as control devices for the landfill.
May 14, 2009	Application No. 8200139.09A was deemed administratively complete for review purposes.
March 12, 2010	The NCDAQ, Permitting Section made a Preliminary Determination that the proposed Sampson County Disposal modification complied with all PSD requirements. Therefore, the Permitting Section proposed approval of the air permit with specific conditions to ensure compliance with all BACT limits.
March 12, 2010	Public Notice of the Preliminary Determination and draft permit was published in The Sampson Independent, giving the public a 30-day notice for the opportunity to submit comments on the Preliminary Determination and draft permit
April 12, 2010	One request for a public hearing was received by the DAQ Director's office from the Blue Ridge Environmental Defense League for this project.
April 12, 2010	The Public Notice period for the Preliminary Determination and draft permit ended. Comments were received, evaluated by the DAQ and the resolutions are discussed in Sections 2.0 and 3.0 of the Final Review.
May 10, 2010	The NCDAQ, Permitting Section made a Final Determination that all applicable North Carolina Environmental Management Commission air pollution regulations, including the PSD requirements have been satisfied and issued Air Permit No. 09431T02 to Sampson County Disposal LLC for the construction and operation of the proposed modification.

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Appendices

SECTION 1.0 - INTRODUCTION

The Roseboro, North Carolina area is in attainment with all the National Ambient Air Quality Standards (NAAQS). The existing Sampson County Disposal LLC landfill is considered a minor source under North Carolina's PSD rules in accordance with 15A NCAC 02D.0530 for all PSD pollutants. A modification to a PSD minor source is subject to PSD if the modification itself exceeds the major source threshold for any PSD regulated pollutant. In the case of this gas-to-energy project, the major source threshold is 250 tons/yr, which includes all quantifiable fugitive emissions. The following table shows the criteria pollutants that will exceed the PSD major source threshold emission rates.

Table 1: Potential Emissions from the proposed PSD Project

PSD Pollutant	PSD Significance Level	Project Emissions	Modeling Required?
Carbon Monoxide	250 tons/yr	474.36 tons/yr	**Yes**
Nitrogen Oxides	40 tons/yr	86.25 tons/yr	**Yes**
Particulate Matter	25 tons/yr	26.02 tons/yr	---
Particulate Matter (PM10)	15 tons/yr	26.02 tons/yr	**Yes**
Particulate Matter (PM2.5)	10 tons/yr	26.02 tons/yr	**Yes**
Sulfur Dioxide	40 tons/yr	7.84 tons/yr	No
VOC	40 tons/yr	14 tons/year	No
Lead	0.6 tons/yr	---	---
Fluorides	3.0 tons/yr	---	---
Sulfuric Acid Mist	7.0 tons/yr	---	---
Hydrogen Sulfide	10.0 tons/yr	0.47 tons/yr	No
TRS	10.0 tons/yr	0.55 tons/yr	No

Public Notice: Pursuant to 40 CFR 51.166(q) "Public Participation", the North Carolina Division of Air Quality (NCDAQ):

A. Published a "Public Notice on Preliminary Determination Regarding Approval of an Application Submitted Under the Regulations for the Prevention of Significant Deterioration of Air Quality" in the March 12, 2010 edition of the Sampson Independent newspaper in the Roseboro area. The public comment period ended April 12, 2010.

B. Sent a copy of the preliminary determination, draft permit, and public notice to Ms. Heather Abrams at U.S. EPA, Region 4.

C. Sent a copy of the application, preliminary determination, draft permit, and public notice to the NCDAQ Fayetteville Regional Office.

D. Posted a copy of the preliminary determination, public hearing, draft permit, and other pertinent documents at the NCDAQ website at http://daq.state.nc.us/calendar/.

E. Notified (via Mr. Chuck Buckler meteorologist with NCDAQ) the appropriate Federal Land Manager (FLM) [Ms. Jill Webster with the US Fish and Wildlife Service] of the PSD application in March 2009. Booker T. Pullen contacted Ms. Jill Webster via letter on March May 14, 2010 and sent a copy of the initial application. The FLM reviewed the proposed emissions increases and concluded that the proposed project would not adversely impact the Swanquarter Class I area. The response from the FLM was received on March 19, 2009.

SECTION 2.0 – RESOLUTION OF COMMENTS

2.1 North Carolina Division of Air Quality Responses to EPA Region IV Comments:

The Public Notice provided for a 30-day review period (March 12, 2010 through April 12, 2010) for submitting written comments on this project. A summary of all comments received during the comment period is provided in this final determination.

- *EPA Comment 1:*
  On January 22, 2010, EPA signed into law a new National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO_2). The new standard is a 1-hour standard set at the level of 100 parts per billion (ppb). The effective date of the new NAAQS will be April 12, 2010. If the final PSD permit for Sampson County Disposal, LLC has not been issued by the time the new NAAQS is effective, the Division will need to include the appropriate air quality analysis before a final PSD permit is issued.

SECTION 2.0 – RESOLUTION OF COMMENTS

NCDAQ Response:
The NCDAQ requested that Sampson County Disposal submit one-hour NO_2 modeling for this project. See Section 3.1 of this review "NO_2 one-hour standard".

- *EPA Comment 2:*
The preliminary determination states: "The PSD estimates were based on the expected worst-case operation scenario [i.e. simultaneous operation of all eight genset engines at maximum flow]. The control devices (flares) are not included in this estimate." This resulted in the following facility wide maximum emissions estimates:

CO emissions from the eight gensets = 2.75 g CO/Hp-hr
NOx emissions from the eight gensets = 0.50 g NOx/Hp-hr
PM10 emissions from the eight gensets = 0.15 g PM10/Hp-hr

However the best available control technology emission limits contained in the draft permit are identical while indicating these limits apply to each genset unit individually. Clarification is needed to the language in the preliminary determination to better explain how the limits are to be applied and how the aggregate emissions from all eight gensets are to be calculated.

NCDAQ Response:
Language will be added in the permit to clarify the BACT limits for individual genset units and/or the aggregate of the eight units. See Section 3.2 of this review "BACT Limits For Eight Genset Units".

- *EPA Comment 3:*
In reviewing the project, Region 4 finds that the application does not clearly support the use of the PM10 surrogate approach for this project and contains some errors. Region 4 modeling staff will provide specific comments separately from this letter.
  - *PM2.5 and PM10 Modeling Scenarios – The air quality impact modeling performed for the PSD permit application did not include PM2.5 emissions. A supplemental 15 December 2009 document provided impact modeling to address the PM2.5 NAAQS. The modeling scenarios used to assess the worst-case ambient impacts in these two documents were different. The PM2.5 supplement performed separate impact assessments for the three planned operating Cell scenarios (i.e., Cell 7, Cell 9, and Cell 11). The modeling provided in the May 2009 PSD permit application was not separated by Cell development but by combinations of flare and generator emissions. These differences should be explained as the worst-case modeled scenarios should be the same for all emitted pollutants.*

  - *Annual PM10 and PM2.5 Emissions – The total PM2.5 emissions should be less than or equal to the total PM10 emissions for this facility. Table 10 of the NCDENR Preliminary Review indicates both PM10 and PM2.5 are emitted at 26 TPY. The December 2009 supplemental analysis shows the total project PM2.5 emissions as 42.5 TPY. This difference should be explained.*

  - *Modeled PM10 and PM2.5 Concentrations – The maximum project only PM10 concentrations reported in the PSD permit application were less than the significant impact levels (i.e., 0.53 ug/m3 annual and 3.98 ug/m3 24-hour). The modeled 8th highest PM2.5 project only concentrations reported in the December 2009 supplemental analysis were much larger (i.e., 3.61 ug/m3 annual and 14.06 ug/m3 24-hour). Because the PM2.5 emissions should be less than or equal to the PM10 emissions, these differences need to be explained.*

  - *Flare Emission Estimates – The estimate of PM2.5 flare emissions modeled with SCREEN3 were indicated to be actual emissions. The permit allowable emission rate should be used in this modeling.*

  - *PM Control Efficiencies – Wetting was indicated to be used to control the emissions of PM2.5. The efficiency of this control was assumed to be 88% for unpaved and pave roads, 75% for earth moving, and 50 % for wind blown emissions. Based on information provided in AP-42 for unpaved roads, efficiencies greater than 75% are difficult to maintain. The basis for the large control efficiency of 88% for roads should be provided.*

SECTION 2.0 – RESOLUTION OF COMMENTS – Continued-

- *NAAQS Compliance Modeling – The PM2.5 NAAQS compliance modeling only added monitored background concentrations to the modeled project only impacts. Other nearby PM2.5 emission sources should be included with the modeling of project emissions. Also, the procedures used in this NAAQS compliance assessment appear not to follow those recommended in the 26 February 2010 Model Clearinghouse Memorandum "Review of Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS". Considering the very small margin available between the estimated PM2.5 ambient concentration and the NAAQS, the appropriateness of the procedures used for the NAAQS compliance assessment should demonstrated*

  NCDAQ Response:
  See Sections 3.3, 3.4, 3.5, and 3.6 of this final review.

2.2 North Carolina Division of Air Quality Responses To Public Notice Comments:

- *Public Notice Comment:*
  On behalf of our members in Sampson County and the Snow Hill community, I make the comments below and request that the Division of Air Quality hold a public hearing on the draft Prevention of Significant Deterioration for the new landfill gas energy facility proposed for this existing landfill.

  NCDAQ Response:
  See Section 3.7 of this Final Review.

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

3.1 *EPA Comment 1:*
On January 22, 2010, EPA signed into law a new National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO_2). The new standard is a 1-hour standard set at the level of 100 parts per billion (ppb). The effective date of the new NAAQS will be April 12, 2010. If the final PSD permit for Sampson County Disposal, LLC has not been issued by the time the new NAAQS is effective, the Division will need to include the appropriate air quality analysis before a final PSD permit is issued.

NO_2 1 hour standard:
The Division of Air Quality has requested that Sampson County Disposal Landfill perform a modeling analysis to address the one-hour NO_2 concentration of at the facility.

The supplemental modeling for this facility was received on April 26, 2010 by the DAQ, Raleigh Central Office. A revised modeling analysis was submitted on May 4, 2010. Sampson County Disposal used a combination of AERMOD, SCREEN3, and the same receptor array as in the previous annual NOx modeling analysis performed for this facility. SCREEN3 was used for the flares, and the H1H impacts were added to AERMOD results for the rest of the sources. This is identical to the modeling procedure that was previously reviewed for annual NOx emissions. The difference for the new one-hour evaluation period was that Sampson County Disposal used the EPA determined statistical processing technique to derive the one-hour AERMOD results. The statistical processor used, was developed by Oris Solution, and verified by the NCDAQ. It generated the result from AERMOD runs, which utilized five years of DAQ process meteorology (Raleigh 1988-1992). A background concentration of 82.7 $\mu g/m^3$, obtained from the NCDAQ, was added for a final concentration to compare to the new NAAQS NO_2 one-hour standard of 188 $\mu g/m^3$. The modeling analysis demonstrated compliance with the National Ambient Air Quality Standards for NO_2 over a one-hour evaluation period at 71% of the NAAQS standard.

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

3.1 EPA Comment 1(NO_2 1 hour standard) - **continued**

An offsite source inventory list was provided by the NCDAQ. A Significant Impact Level (SIL) was established by calculating 2.5% of the NAAQS value since the one-hour NO_2 standard does not currently have a SIL. The maximum impact area for this proposed project was established by finding the most distant point where approved dispersion modeling predicts a significant ambient impact will occur. The impact area extends from the source out to 10.5 km. The offsite source within this 10.5 km range were included in the modeling and the sources between the 10.5km range and 50 km range were evaluated using the 20D rule based on hourly potential emission rates from the surrounding facilities. The potential emission rates (or maximum hourly permitted rates) of NO_2 were identified based on permit information for these facilities. If a permitted emission rate was not specified in the permit, a maximum hourly NOx emission rate was calculated based on a fuel emission factor (default AP-42) and the equipment combustion capacity.

NOx concentrations from the existing flares located on site (one flare) and on the adjacent site (two flares), were calculated based on SCREEN 3 model results and conservatively added to the AERMOD concentrations from the point sources. The one hour background value was supplied by the NCDAQ.

NAAQS evaluation (using the Q/D = 20 screening method) must use the allowable emissions without controls, unless the permit has a federally enforceable limit such as PSD Avoidance, Synthetic Minor, BACT, or other limit.

Where Q = tpy, D = km, inside the screening area (50 km outside the impact area)

The companies that are a part of the one-hour NO_2 evaluation for the Sampson County Disposal PSD Facility are as follows:

- Sampson County Disposal Landfill
- Sampson County Landfill (Adjacent to Sampson County Disposal Landfill)
- Elizabethtown Power, LLC
- Barnhill Contracting – Clinton Plant
- DAK Americas, LLC
- Public Works Commission Butler-Warner General
- Hanson Brick East, LLC

SAMPSON COUNTY DISPOSAL LANDFILL

Flare (existing landfill gas-fired, 141 million Btu per hour heat input, CD-1)
Flare (new landfill gas-fired, 141 million Btu per hour heat input, CD-2) (existing large and new large flare will not operate simultaneously)
Flare (new small landfill gas-fired, 21 million Btu per hour heat input, CD-2) (new large flare and new small flare may operate simultaneously)
Eight genset units (1600 kW, 2233 Hp each) (the worse case NOx emission rate occurs when all eight genset units operate simultaneously without the flares)

NO_2 emissions from the flare @ Sampson County Disposal Landfill:

$$\frac{141.3\ mmBtu}{hour} \times \frac{0.068\ lbs\ NOx}{mmBtu} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{6.73\ lbs\ NO_2}{hour}$$

$$\frac{21\ mmBtu}{hour} \times \frac{0.068\ lbs\ NOx}{mmBtu} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{1.0\ lbs\ NO_2}{hour}$$

NO_2 emissions from each Genset unit @ Sampson County Disposal:

$$\frac{0.5\ g\ NOx}{Hp-hour} \times \frac{2233\ Hp}{unit} \times \frac{1\ lb\ NOx}{453.59\ g\ NOx} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{1.72\ lbs\ NO_2\ (for\ one\ unit)}{hour}$$

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

3.1 EPA Comment 1(NO_2 1 hour standard) – **continued**

SAMPSON COUNTY LANDFILL (Adjacent to the Sampson County Disposal Lanfill)
Flare (landfill gas-fired, 32.5 million Btu per hour heat input, CD-1)
Flare (landfill gas-fired, 4.8 million Btu per hour heat input, CD-2)

NO_2 emissions from the flare (CD-1) @ Sampson County Landfill:

$$\frac{32.5\ mmBtu}{hour} \times \frac{0.068\ lbs\ NOx}{mmBtu} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{1.55\ lbs\ NO_2}{hour}$$

NO_2 emissions from the flare (CD-2) @ Sampson County Landfill:

$$\frac{4.8\ mmBtu}{hour} \times \frac{0.068\ lbs\ NOx}{mmBtu} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{0.23\ lbs\ NO_2}{hour}$$

ELIZABETHTOWN ENERGY, LLC
Diesel-fired emergency fire pump (340 Hp, IES-1)
Boiler (Coal/natural gas/No. 2 fuel oil/No. 4 fuel oil/tire derived fuel/pelletized paper fuel/flyash briquette-fired, ES-1A)
Boiler (Coal/natural gas/No. 2 fuel oil/No. 4 fuel oil/tire derived fuel/pelletized paper fuel/flyash briquette-fired, ES-1B)

NO_2 emissions from boilers (ID Nos. ES-1A & ES-1B) at Elizabethtown Energy, LLC
The boilers are limited to 141.9 lbs per hour each (total = 283.8 lbs NOx per hour total) per regulation 15A NCAC 2D .0501(e) in the Title V permit.

The emergency fire pump engine potential NOx emissions is:

$$\frac{3.1\times10^{-2}\ lbs\ NOx}{Hp-hour} \times \frac{340\ Hp}{unit} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{7.38\ lbs\ NOx}{hour}$$

$$\frac{283.8\ lbs\ NOx}{hour} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{198.66\ lbs\ NO_2}{hour}$$

BARNHILL CONTRACTING
Asphalt heater (natural gas-fired, 2.0 mmBtu/hour heat input, I-H1)
Hot oil heater (natural gas-fired, 1.5 mmBtu/hour heat input, I-H2)
Asphalt heater (natural gas-fired, 1.0 mmBtu/hour heat input, I-H3)
Asphalt heater (natural gas-fired, 0.8 mmBtu/hour heat input, I-H4)
Aggregate dryer/Mixer (natural gas/No 2 fuel oil/recycled No. 2 fuel oil/No. 4 fuel oil/recycled No. 4 fuel oil-fired, 100 mmBtu/hour heat input, ES1)

NO_2 emissions from the four heaters firing natural gas @ Barnhill Contracting:

$$\frac{140\ lbs\ NOx}{1\times10^6\ ft^3} \times \frac{1\ ft^3}{1020\ Btu} \times \frac{5.3\times10^6\ Btu}{hour} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = 0.51\frac{lbs\ NO_2}{hour}$$

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

NO_2 emissions from the aggregate dryer/mixer firing No. 4 fuel oil @ Barnhill Contracting: (Using DAQ Asphalt Emissions Calculator Spreadsheet, Revision C (5/7/2003)

Data Input: Heat input = 100 mmBtu per hour
Production limit in permit = 400 tons per hour maximum
Production limit in permit = 800,000 tons per year maximum

Result = 20 lbs NOx

$$\frac{20\ lbs\ NOx}{hour} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = 14.0\ \frac{lbs\ NO_2}{hour}$$

DAK AMERICAS, LLC

Emergency fire pump (200 Hp, I-01)
Emergency fire pump (300 Hp, I-02)
Emergency Gasoline Generator (16 Hp, I-03)
Gasoline Generator (16 Hp, I-04)
Dowtherm heater with low NOx burners (natural gas/No. 2 fuel oil-fired, 41.7 mmBtu per hour heat input, ES94-9a)
Dowtherm heater with low NOx burners (natural gas/No. 2 fuel oil-fired, 41.7 mmBtu per hour heat input, ES94-9b)
Boiler (natural gas/No. 2 fuel oil/No. 6 fuel oil-fired, 222 mmBtu per hour heat input, ES-001)
Boiler (natural gas/No. 2 fuel oil/No. 6 fuel oil-fired, 222 mmBtu per hour heat input, ES-002)
Boiler equipped with low NOx burners and flue gas recirculation (natural gas-fired, 100 mmBtu per hour heat input, ES-003)

NO_2 emission from the four engines @DAK Americas, LLC:
DAQ spread sheet emission factor for diesel-fired engines = 3.1 E-02 lbs NOx per Hp-hour
DAQ spread sheet emission factor for gasoline-fired engines = 1.1 E-02 lbs NOx per Hp-hour

$$\frac{3.1\times10^{-2}\ lbs\ NOx}{Hp-hour} \times \frac{200\ Hp}{unit} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{4.34\ lbs\ NO_2}{hour}$$

$$\frac{3.1\times10^{-2}\ lbs\ NOx}{Hp-hour} \times \frac{300\ Hp}{unit} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{6.51\ lbs\ NO_2}{hour}$$

$$\frac{1.1\times10^{-2}\ lbs\ NOx}{Hp-hour} \times \frac{16\ Hp}{unit} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} \times 2\ units = \frac{0.25\ lbs\ NO_2}{hour}$$

NO_2 emissions from boiler (ES-003) with low NOx burners firing natural gas:

$$\frac{140\ lbs\ NOx}{1\times10^6\ ft^3} \times \frac{1\ ft^3}{1020\ Btu} \times \frac{100\times10^6\ Btu}{hour} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = 9.61\ \frac{lbs\ NO_2}{hour}$$

NO_2 emissions from the two Dowtherm heaters (ES 94-9a and 9b) with low NOx burners when firing No. 2 fuel oil:

$$\frac{20\ lbs\ NOx}{1000\ gal.\ No.2\ fuel\ oil} \times \frac{1\ gal.\ No.2\ fuel\ oil}{140{,}000\ Btu} \times \frac{83.4\times10^6\ Btu}{hour} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} \times \frac{(1-35\%\ control)}{1} = 5.42\ \frac{lbs\ NO_2}{hour}$$

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

NO_2 emissions from the two boilers (ES-001 and 002) when firing No. 6 fuel oil:

$$\frac{47\ lbs\ NOx}{1000\ gal.\ No.2\ fuel\ oil} \times \frac{1\ gal.\ No.2\ fuel\ oil}{150{,}000\ Btu} \times \frac{444 \times 10^6\ Btu}{hour} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = 97.38 \frac{lbs\ NO_2}{hour}$$

HANSON BRICK EAST, LLC, dba HANSON BRICK - ROSEBORO

Brick tunnel kiln (natural gas/No. 2 fuel oil-fired, 23 mmBtu per hour heat input, ES-1LK)
Brick dryer for kiln 2 (natural gas/propane 9.6 mmBtu per hour heat input, I-LK2D)
Brick tunnel kiln (natural gas/No. 2 fuel oil-fired, 23 mmBtu per hour heat input, ES-2LK)

NO_2 emissions from combustion sources @ Hanson Brick East, LLC:

Using AP-42 factors, Table 11.3-3
Production rate = 10.5 tons per hour for each kiln
Emission factor = 0.098 lbs NOx per ton of bricks fired (brick dryer)
Emission factor = 0.35 lbs NOx per ton of bricks fired (natural gas-fired kiln)
Emission factor = 0.455 lbs NOx per ton of bricks fired (No. 2 fuel oil-fired)
Note: Added 30% increase for No. 2 fuel oil firing based on the percentage difference between natural gas firing in a boiler (23 mmBtu per hour heat input) and No. 2 fuel oil firing.

Brick dryer (natural gas-fired, ID No. 1-LK2D)

$$\frac{0.098\ lbs\ NOx}{ton\ of\ brick\ fired} \times \frac{10.5\ tons\ of\ brick\ fired}{hour} \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{0.72\ lbs\ NO_2}{hour}$$

Brick kilns (No. 2 fuel oil-fired, ID Nos. ES-1LK and ES-2LK)

$$\frac{0.455\ lbs\ NOx}{ton\ of\ brick\ fired} \times \frac{10.5\ tons\ of\ brick\ fired}{hour} \times 2\ units \times \frac{70\ lbs\ NO_2}{100\ lbs\ NOx} = \frac{6.69\ lbs\ NO_2}{hour}$$

PUBLIC WORKS COMMISSION BUTLER-WARNER GENERATION

Diesel engine (500 hp, ID No. ISE3)
Diesel engine (500 hp, ID No. ISE4)

Six natural gas/ No. 2 fuel oil-fired simple-cycle/combined-cycle turbine generator (General Electric Model No. 5001P, 341.1 million Btu per hour nominal heat input rate)

Two natural gas/No. 2 fuel oil-fired simple-cycle turbine generators (General Electric Model No. 5001P, 341.1 million Btu per hour nominal heat input rate each)

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

NO_2 emissions from the two generators @ PWC – Warner Generation

DAQ spread sheet emission factor for engines = 3.1 E-02 lbs NOx per Hp-hour

$$\frac{3.1\times10^{-2}\ lbs\ NOx}{Hp-hour}\times\frac{1000\ Hp}{unit}\times\frac{70\ lbs\ NO_2}{100\ lbs\ NOx}=\frac{21.7\ lbs\ NO_2}{hour}$$

NO_2 emissions from the eight combustion turbines @ PWC – Warner Generation

Emission factor = 0.138 lbs NOx/mmBtu heat input for either fuel oil or natural gas
(This emission factor comes from application form "B" for Unit 7 which provides an emission rate for BLFN with increased water injection for lowering NOx emissions. The backup information cited a stack test on unit GT-2 as the reference.)

Sample calculation for the five simple/combined cycle units

Total heat input for the five simple/combined cycle units = 5 x 341.1 = 1705.2 mmBtu per hour

$$\frac{1705.5\ mmBtu}{hour}\times\frac{0.138\ lbs\ NOx}{mmBtu}\times\frac{70\ lbs\ NO_2}{100\ lbs\ NOx}=\frac{164.75\ lbs\ NO_2}{hour}\quad (GT\ 1,2,3,6,7)$$

NO_2 one hour modeling for worse case scenario {The worse case modeling scenario is operating the eight genset units without any of the onsite flares operating, adding the offsite sources found within the 10.5 km radius from the proposed modification and adding the sources between 10.5 km and 50 km that were selected using the 20D rule.}

Emission Point	Description and Facility Location	Emission Factor	Potential Emission Rate (worse case)
Sampson Co. Disposal Facility			
Genset Unit #1 (GS1)	Landfill gas-fired, 2233 Hp	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Genset Unit #2 (GS2)	Landfill gas-fired, 2233 Hp@ Sampson Co. Disposal Facility	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Genset Unit #3 (GS3)	Landfill gas-fired, 2233 Hp@ Sampson Co. Disposal Facility	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Genset Unit #4 (GS4)	Landfill gas-fired, 2233 Hp@ Sampson Co. Disposal Facility	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Genset Unit #5 (GS5)	Landfill gas-fired, 2233 Hp@ Sampson Co. Disposal Facility	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Genset Unit #6 (GS6)	Landfill gas-fired, 2233 Hp@ Sampson Co. Disposal Facility	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Genset Unit #7 (GS7)	Landfill gas-fired, 2233 Hp@ Sampson Co. Disposal Facility	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Genset Unit #8 (GS8)	Landfill gas-fired, 2233 Hp@ Sampson Co. Disposal Facility	0.5 g NO_2/Hp-hr	1.72 lbs NO_2/hr (70% of NOx)
Sampson County Landfill			
Flare (CD-1)	Landfill gas-fired flares (32.5 million Btu per hour heat input)	0.068 lbs NOx per mmBtu	1.55 lbs NO_2/hr (70% of NOx)
Flare (CD-2)	Landfill gas-fired flares (4.8 million Btu per hour heat input)	0.068 lbs NOx per mmBtu	0.23 lbs NO_2/hr (70% of NOx)

-Table continued on the next page-

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

NO_2 one hour modeling for worse case scenario {The worse case modeling scenario is operating the eight genset units without any of the onsite flares operating, adding the offsite sources found within the 10.5 km radius from the proposed modification and adding the sources between 10.5 km and 50 km that were selected using the 20D rule.} -continued-

Emission Point	Description and Facility Location	Emission Factor	Potential Emission Rate (worse case)
Elizabethtown Energy, LLC			
ES-1A & ES-1B (CS1)	Two coal/natural gas/No. 2/No. 4 fuel oil/tire derived fuel/palletized paper fuel/flyash briquette-fired boilers, 215 mmBtu/hour each, NOx reduction technology	Limited to 141.9 lbs NOx /hour each	198.66 lbs NO_2/hr (70% of NOx)
IES-1	Diesel-fired emergency fire pump (340 Hp) @Elizabethtown Energy, LLC	3.1E-02 lbs NOx per Hp-hour	7.38 lbs NO_2/hr (70% of NOx)
Barnhill Contracting			
I-H1 (BHERP3)	Asphalt heater (natural gas-fired, 2.0 mmBtu/hour heat input)	140 lbs NOx per 1E+06 ft^3	0.51 lbs NO_2/hr (70% of NOx)
I-H2 (BHERP3)	Hot oil heater (natural gas-fired, 1.5 mmBtu/hour heat input)		
I-H3 (BHERP3)	Asphalt heater (natural gas-fired, 1.0 mmBtu/hour heat input		
I-H4 (BHERP3)	Asphalt heater (natural gas-fired, 0.8 mmBtu/hour heat input)		
ES1 (BHERP1)	One natural gas/No. 2 fuel oil/recycled No. 2 fuel oil/No. 4 fuel oil/recycled No. 4 fuel oil-fired aggregate dryer/mixer (100 mmBtu per hour heat input)	DAQ spread sheet emission factor	14.0 lbs NO_2/hr (70% of NOx)
DAK Americas, LLC			
ES-94-9a & 9b, (NSPS) (DAKHTR)	Two natural gas/No. 2 fuel oil-fired Dowtherm heaters with low NOx burners, 41.7 mmBtu/hour heat input each	20 lbs NOx per 1000 gal. No. 2	5.42 lbs NO_2/hr (70% of NOx)
I-01	Emergency fire pump (200 Hp)	3.1 x 10^{-2} lbs/Hp-hr	4.34 lbs NO_2/hr (70% of NOx)
I-02	Emergency fire pump (300 Hp)	3.1 x 10^{-2} lbs/Hp-hr	6.51 lbs NO_2/hr (70% of NOx)
I-03 and I-04	Two Gasoline Generators (16 Hp each)	1.1 x 10^{-2} lbs/Hp-hr	0.25 lbs NO_2/hr (70% of NOx)
Boiler (ES-001 & 002) (DAKBLR)	Two natural gas/No. 2 fuel oil/No. 6 fuel oil-fired boilers, 222 mmBtu/hour heat input each	47 lbs NOx per 1000 gal. No. 6	97.38 lbs NO_2/hr (70% of NOx)
Boiler (ES-003, NSPS) (DAKNB)	One natural gas-fired boiler equipped with low NOx burners and flue gas recirculation, 100 mmBtu/hr heat input rate	140 lbs NOx per 1E+06 ft^3	9.61 lbs NO_2/hr (70% of NOx)
Hanson Brick East, LLC			
ES-ILK (HBEP1LK)	Two brick tunnel kilns (natural gas/No. 2 fuel oil-fired, 23 mmBtu per hour heat input each)	0.455 lbs NOx per ton of brick fired	6.69 lbs NO_2/hr (70% of NOx)
I-LK2D)	Brick dryer for kiln 2 (natural gas/propane 9.6 mmBtu per hour heat input)	0.098 lbs NOx per ton of brick fired	0.72 lbs NO_2/hr (70% of NOx)

-Table continued on the next page-

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS

NO_2 one hour modeling for worse case scenario {The worse case modeling scenario is operating the eight genset units without any of the onsite flares operating, adding the offsite sources found within the 10.5 km radius from the proposed modification and adding the sources between 10.5 km and 50 km that were selected using the 20D rule.} -continued-

Emission Point	Description and Facility Location	Emission Factor	Potential Emission Rate (worse case)
Public Works Commission – Butler Generation Plant			
GT-8 NSPS STACK2	One natural gas/ No. 2 fuel oil-fired simple-cycle/combined-cycle turbine generator (General Electric Model No. 5001P, 341.1 million Btu per hour nominal heat input rate), with exhaust gas directed through one heat recovery steam generator	0.24 lbs NOx per mmBtu hour heat input	57.30 lbs NO_2/hr (70% of NOx)
GT-1,2,3,6, & 7 HRSG STACK3	Five natural gas/ No. 2 fuel oil-fired simple-cycle/combined-cycle turbine generator (General Electric Model No. 5001P, 341.1 million Btu per hour nominal heat input rate), with exhaust gas directed through one heat recovery steam generator	0.24 lbs NOx per mmBtu hour heat input	164.75 lbs NO_2/hr (70% of NOx)
GT-4 & 5 Simple Cycle STACK5	Two natural gas/No. 2 fuel oil-fired simple-cycle turbine generators (General Electric Model No. 5001P, 341.1 million Btu per hour nominal heat input rate each)	0.24 lbs NOx per mmBtu hour heat input	65.9 lbs NO_2/hr (70% of NOx)
ISE3 and ISE4	Diesel fired engines (500 Hp each)	3.1×10^{-2} lbs/Hp-hr	21.7 lbs NO_2/hr (70% of NOx)

3.2 *EPA Comment 2:*

The preliminary determination states: "The PSD estimates were based on the expected worst-case operation scenario [i.e. simultaneous operation of all eight genset engines at maximum flow]. The control devices (flares) are not included in this estimate." This resulted in the following facility wide maximum emissions estimates:

CO emissions fro the eight gensets = 2.75 g CO/Hp-hr
NOx emissions from the eight gensets = 0.50 g NOx/Hp-hr
PM10 emissions from the eight gensets = 0.15 g PM_{10}/Hp-hr

However the best available control technology emission limits contained in the draft permit are identical while indicating these limits apply to each genset unit individually. Clarification is needed to the language in the preliminary determination to better explain how the limits are to be applied and how the aggregate emissions from all eight gensets are to be calculated.

BACT Limits For Eight Genset Units

The BACT limits listed in the permit are per genset unit. The final review will clarify how the BACT limits were achieved using the proposed limits (in g/Hp-hour) calculated into lb/hour limits for each pollutant as listed in the Permit.

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS –Continued-

PSD Pollutant	PSD Significance Level	BACT Limits	Project Emissions * (Eight units)	Modeling Required?
Carbon Monoxide	250 tons/yr	13.54 lbs/hour (2.75 g/Hp-hr)	474.36 tons/yr	**Yes**
Nitrogen Oxides	40 tons/yr	2.46 lbs/hour (0.50 g/Hp-hr)	86.25 tons/yr	**Yes**
Particulate Matter	25 tons/yr	0.74 lbs/hour (0.15 g/Hp-hr)	26.02 tons/yr	---
Particulate Matter (PM10)	15 tons/yr	0.74 lbs/hour (0.15 g/Hp-hr)	26.02 tons/yr	**Yes**
Particulate Matter PM2.5	10 tons/yr	0.74 lbs/hour (0.15 g/Hp-hr)	26.02 tons/yr	**Yes**

$$\frac{2.75\ g\ CO}{Hp-hour}\times\frac{2233\ Hp}{unit}\times\frac{1\ lb\ CO}{453.59\ g\ CO}=\frac{13.54\ lbs\ CO\ (for\ one\ unit)}{hour}\quad\left[\frac{474.4\ tons\ CO\ (for\ eight\ units)}{year}\right]$$

$$\frac{0.5\ g\ NOx}{Hp-hour}\times\frac{2233\ Hp}{unit}\times\frac{1\ lb\ NOx}{453.59\ g\ NOx}=\frac{2.46\ lbs\ NOx\ (for\ one\ unit)}{hour}\quad\left[\frac{86.25\ tons\ NOx\ (for\ eight\ units)}{year}\right]$$

$$\frac{0.15\ g\ PM10}{Hp-hour}\times\frac{2233\ Hp}{unit}\times\frac{1\ lb\ PM10}{453.59\ g\ PM10}=\frac{0.74\ lbs\ PM10}{hour}\quad\left[\frac{26.0\ tons\ PM10\ (for\ eight\ units)}{year}\right]$$

$$\frac{0.15\ g\ PM2.5}{Hp-hour}\times\frac{2233\ Hp}{unit}\times\frac{1\ lb\ PM2.5}{453.59\ g\ PM2.5}=\frac{0.74\ lbs\ PM2.5}{hour}\quad\left[\frac{26.0\ tons\ PM2.5\ (for\ eight\ units)}{year}\right]$$

* In order to calculate the tons per year for the eight genset units, multiply the hourly emission rate by 8 total units and 8760 hours/year, then divide by 2000 lbs/ton.

3.3. *EPA Comment 3:*

In reviewing the project, Region 4 finds that the application does not clearly support the use of the PM10 surrogate approach for this project and contains some errors. Region 4 modeling staff will provide specific comments separately from this letter.

3.3.1 PM2.5 and PM10 Modeling Scenarios – The air quality impact modeling performed for the PSD permit application did not include PM2.5 emissions. A supplemental 15 December 2009 document provided impact modeling to address the PM2.5 NAAQS. The modeling scenarios used to assess the worst-case ambient impacts in these two documents were different. The PM2.5 supplement performed separate impact assessments for the three planned operating Cell scenarios (i.e., Cell 7, Cell 9, and Cell 11). The modeling provided in the May 2009 PSD permit application was not separated by Cell development but by combinations of flare and generator emissions. These differences should be explained as the worst-case modeled scenarios should be the same for all emitted pollutants.

3.3.2 Annual PM10 and PM2.5 Emissions – The total PM2.5 emissions should be less than or equal to the total PM10 emissions for this facility. Table 10 of the NCDENR Preliminary Review indicates both PM10 and PM2.5 are emitted at 26 TPY. The December 2009 supplemental analysis shows the total project PM2.5 emissions as 42.5 TPY. This difference should be explained.

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS –Continued-

3.3.3 Modeled PM10 and PM2.5 Concentrations – The maximum project only PM10 concentrations reported in the PSD permit application were less than the significant impact levels (i.e., 0.53 ug/m^3 annual and 3.98 ug/m^3 24-hour). The modeled 8th highest PM2.5 project only concentrations reported in the December 2009 supplemental analysis were much larger (i.e., 3.61 ug/m^3 annual and 14.06 ug/m3 24-hour). Because the PM2.5 emissions should be less than or equal to the PM10 emissions, these differences need to be explained.

NCDAQ Response:
The PSD modification at this landfill facility proposes to install eight landfill gas-fired genset units (4-stroke, lean burn, 1,600 kW each) for the combustion of collected landfill gas (LFG) for the production of electricity. Also, one large backup candlestick-type flare (CD-2, 141 mmBtu/hr, 4700 cfm) and one smaller candlestick-type flare (CD-3, 21 mmBtu/hr, 700 cfm) will also be constructed with this project. The two flares associated with this modification will be used as control devices for the landfill and were not included as sources in this project. The worse-case scenario for this modification is the simultaneous operation of the eight genset units when the landfill is at maximum landfill gas generation. Any excess landfill gas not burned in the generators will be burned in the existing large flare. After installation of the eight genset units, and the landfill grows to maximum size & landfill gas generation, the two new flares will only operate when the genset units are inoperable.

In the earlier modeling (May 2009) for the project, the maximum emissions from the worse case scenario for this project modification were compared to the significant impact levels (SILS). PM10 and PM2.5 emissions from the modification were estimated to be 26.02 tons per year for each pollutant (this value does not include the fugitive emissions from the haul roads because they are not a part of the proposed project). PM2.5 does not currently have a SIL level, and the PM10 SIL limit was not exceeded. Therefore, the earlier (May 2009) modeling did not have to include non-project related emissions at the facility such as haul roads and other non-project fugitive PM10 and/or PM2.5 emissions.

In 1997 the EPA promulgated an ambient standard for PM-2.5. Immediately following their promulgation, the EPA issued (interim [*sic*]) guidance recommending the use of PM-10 as a surrogate since they did not have the technical data needed to regulate PM-2.5 directly. In 2005 the EPA re-affirmed their recommendation of their recommendation to use PM10 as a surrogate. More than ten years since the EPA promulgated the PM-2.5 ambient standard, the agency has still not provided the technical basis for actually regulating this pollutant. In 2008, the EPA issued its final rule setting forth the procedural requirements under NSR for PM-2.5, however, the EPA has still not promulgated the modeling techniques needed to actually fulfill the requirements of NSR for PM-2.5. The EPA does not require NC to implement this rule until 2011. Pursuant to DAQ policy (included as Appendix "A") issued on December 10, 2009, Sampson County Disposal LLC modeled PM2.5 emissions with the procedures and standards currently recommended by the DAQ. In addition, this facility provided a revised BACT analysis addressing PM2.5.

In the later modeling analysis (December 2009), the Division of Air Quality requested that a PM2.5 (filtered and condensable) NAAQs dispersion modeling analysis be performed by this facility. This request to model PM2.5 included the entire facility (ie. haul roads, storage piles, other fugitive emissions, etc.) resulting in higher PM2.5 values than the previous modeling.

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS –Continued-

3.4 *EPA Comment 4:*
Flare Emission Estimates – The estimate of PM2.5 flare emissions modeled with SCREEN3 were indicated to be actual emissions. The permit allowable emission rate should be used in this modeling.

NCDAQ Response:
NAAQs modeling shall always be performed using allowable emissions. The 2.64 lb/hr of PM2.5 modeled from the flare is based on calculations using the AP-42, Section 2.4, November 1998, Final Section (current official AP-42) at the maximum flow rate of the flare. The PM emission factor from AP-42 is 17 lb/mmdscf of methane burned. The existing and the new large flare are both rated at 141.3 mmBtu/hr. At 500 Btu/scf for LFG, the flares could burn 282,600 scf of LFG each. The 55% methane content in the LFG at this facility is based on the composition of the LFG actually measured at the Sampson landfill. This means that the flares are capable of burning 155,430 scf/hr of methane (0.15543 mmscf of methane). At 17 lb/mmdscf of methane, the associated PM emission rate would be 2.64 lb/hr.

The existing flare is rated at 4700 acfm. To be conservative the same flow rate was used as 4700 scfm (the temperature would actually cause the scfm to be lower than the acfm). Also, the correction for moisture in the landfill gas was assumed to be insignificant.

$$\frac{4700\ scf\ landfill\ gas}{\text{min}\,ute} \times \frac{55\ parts\ methane}{100\ landfill\ gas} \times \frac{60\ \text{min}\,utes}{hour} \times \frac{1\ mmscf\ methane\ gas}{1\times10^{6}\ methane\ gas} \times \frac{17\ lbs\ PM10}{mmscf\ methane\ gas\ (dry)} = \frac{2.64\ lbs\ PM10}{hour}$$

Since this PM is mostly fine particle products of incomplete combustion, 100% of the PM is considered to be PM2.5.

Note: Adjusting the calculations to dry measurements would lower the flow rate an in turn lower the PM2.5 emissions from the flare. Also, disregarding the moisture content results in a conservatively higher calculated PM2.5 emission rate. The calculated PM2.5 emission rate (2.64 lbs PM2.5/hour) is based on the maximum potential to emit from the flare.

There is no allowable PM2.5 emission rate associated with flares. NSPS WWW requires that captured LFG be vented to an open flare, or an alternative 98% efficient combustion device. Although no PM mass limit is specified for a flare in Subpart WWW, the actual PM2.5 emission rate for a flare installed to comply with Subpart WWW represents the default allowed emission rate.

3.5 *EPA Comment 5:*
PM Control Efficiencies – Wetting was indicated to be used to control the emissions of PM2.5. The efficiency of this control was assumed to be 88% for unpaved and pave roads, 75% for earth moving, and 50 % for wind blown emissions. Based on information provided in AP-42 for unpaved roads, efficiencies greater than 75% are difficult to maintain. The basis for the large control efficiency of 88% for roads should be provided.

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS –Continued-

3.5 *EPA Comment 5:* - *Continued-*

It is generally recognized that AP-42 presents emission calculation procedures for average emission rates that are most accurate for large populations of sources and that individual site emission rates can vary significantly from these average emission rates. A review of the AP-42 Section 13.2.2 emission estimation procedures for unpaved roads indicates a greater deal of uncertainty and variability with these empirically derived emission calculation methods than with most AP-42 emission factors. As discussed in Section 13.2.2, the uncontrolled emissions are sensitive to site-specific variables including silt loading, vehicle weight, and vehicle speed. Equation 1a used to calculate uncontrolled emissions from unpaved roads in the PM2.5 Modeling Supplement has a B rating, provided it is used with site-specific factors obtained from onsite sampling and analysis. However, as explained in Section 13.2.2, this rating should be reduced by 2 letters (D rating) if the equation uses default values presented in Section 13.2.2. The conclusion drawn from reviewing this Section 13.2.2 discussion is that it is appropriate and preferable to adjust the emission calculation procedures to account for site-specific conditions.

EPA's comment seems to imply that 75% control of unpaved road dust represents the upper range of potential control efficiency for watering. However, Figure 13.2.2-2 (page 13.2.2-12) shows a control efficiency of 75% at a moisture ratio of 2 with an efficiency approaching 95% at a moisture ratio of 5. This indicates that control efficiencies up to 95% control are possible with watering.

Section 13.2.2 also indicates that other measures can be implemented to reduce emissions, including restrictions on vehicle speed. However, Equation 1a for industrial sites does not include an adjustment for vehicle speed in contrast to Equation 1b for publicly accessible roads, and there is no method specified to quantify emission reductions due to vehicle speed limits at an industrial facility (landfill). Section 13.2.2 also indicates that other surface treatments, such as chemical suppression, that change the physical characteristics of the surface can be used to reduce emissions.

In the case of the SCD landfill, the facility uses watering as the primary dust control for unpaved haul roads. However, the facility also enforces a vehicle speed limit of 20 MPH on the site. While vehicle speeds on the paved portions of the access road generally approach 20 MPH, vehicles tend to slow down further on the unpaved haul roads in the disposal area. Finally, visual observation of the unpaved haul road surfaces at the facility indicates very little loose soil and a general compaction which tends to suppress dust formation.

Based on these site-specific considerations, we used a control efficiency estimate of 88% to account for the combined effects of watering, reduced vehicle speeds, and the observed condition of the unpaved haul road surfaces. The reference for this value is "Fugitive Dust Modeling with AERMOD for PM10 Emissions from a Municipal Waste Landfill". A copy of this reference is attached for you review. As indicated by the title, we used this reference as a guide during the PM2.5 modeling analysis. Page 6 of this document references an assumed 88% cumulative emissions control for unpaved haul roads from watering and chemical suppressants. While the SCD landfill does not utilize chemical suppressants, in our engineering judgment, we believe that the cited 88% combined control efficiency in this document is representative of the combined control efficiency achieved at the SCD landfill due to watering, vehicle speed restrictions, and the observed condition of the haul road surfaces. This value also represents a mid-range estimate of the control efficiency for watering presented in AP-42 Figure 13.2.2-2 (75-95%).

Included in this final review is a case study by SCS Engineers and BlueScape Environmental that was performed on a Municipal Solid Waste Landfill located in eastern Oregon. This study focused on the current regulatory policies and technical issues regarding fugitive PM10 modeling and AERMOD from mechanically generated fugitive emissions from haul roads. [See Attachment "APPENDIX B" of this review]

SECTION 3.0 – REVISIONS/AMENDMENTS TO PRELIMINARY DETERMINATION AS A RESULT OF COMMENTS, CHANGES, & RECOMMENDATIONS –Continued-

3.6 *EPA Comment 6:*

NAAQS Compliance Modeling – The PM2.5 NAAQS compliance modeling only added monitored background concentrations to the modeled project only impacts. Other nearby PM2.5 emission sources should be included with the modeling of project emissions. Also, the procedures used in this NAAQS compliance assessment appear not to follow those recommended in the 26 February 2010 Model Clearinghouse Memorandum "Review of Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS". Considering the very small margin available between the estimated PM2.5 ambient concentration and the NAAQS, the appropriateness of the procedures used for the NAAQS compliance assessment should demonstrated

NCDAQ Response:

As an "approved State", North Carolina is not required to follow the Model Clearinghouse Memorandum "Review of Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS". On December 10, 2009 the DAQ issued a PM2.5 NSR Transition Policy (See Appendix "A" of this review). The NSR Transition policy was followed by Sampson County Disposal to perform PM2.5 NAAQs dispersion modeling for this project.

The North Carolina DAQ policy states: "For any project that is a new major stationary source of primary PM2.5, or for an existing source that proposes a modification that results in a significant emissions increase of primary PM2.5, the source will be required to demonstrate compliance with the national ambient air quality standard for PM2.5 as adopted by North Carolina at 15A NCAC 2D .0400. This demonstration shall be performed based on the source's primary PM2.5 emissions and shall use the most representative available PM2.5 ambient monitoring background concentration. The facility will not be required to include off-site inventory at this time. This transitional modeling procedure will be reviewed as more reliable PM2.5 inventory data become available or when EPA issues a final PM2.5 modeling rule.

3.7 **North Carolina Division of Air Quality Responses To Public Notice Comments:**

Public Notice Comment:

On behalf of our members in Sampson County and the Snow Hill community, I make the comments below and request that the Division of Air Quality hold a public hearing on the draft Prevention of Significant Deterioration for the new landfill gas energy facility proposed for this existing landfill.

NCDAQ Response:

The Division of Air Quality Director, Mr. Keith Overcash, reviewed the public hearing request by the Blue Ridge Environmental Defense League and decided not to grant a public hearing for this proposed project.

4.0 FINAL DETERMINATION

The NCDAQ, Permitting Section has concluded its review of the permit application and made a final determination that the proposed project will comply with all applicable North Carolina Environmental Management Commission air pollution regulations, including the PSD requirements. This conclusion was based on meeting the following requirements:

1. Apply the Best Available Control Technology on a case-by-case basis to each emission unit that will emit any amount of a significant pollutant, including a demonstration that emission of air toxics will not exceed the acceptable ambient levels (AALs) as regulated by the NCDAQ.

2. Perform an air quality analysis to demonstrate that for each pollutant that triggered review neither allowable PSD ambient air increments nor National Ambient Air Quality Standards (NAAQS) will be violated as a result of emissions from the proposed project.

3. Perform an analysis to demonstrate that emissions from the proposed project will neither cause adverse impacts to soils and vegetation nor cause degradation of visibility, and that economic growth associated with the project will not cause a significant increase in regional air pollutant levels.

4. Demonstrate that air emissions resulting from the proposed project will not adversely impact any PSD Class I area, and

5. Undergo adequate public participation including public notice, and a 30-day public comment period. Therefore, the NCDAQ, Permitting Section will issue Air Permit No. 09431T02 with specific conditions and emission limits, for the construction and operation of the Sampson County Disposal LLC proposed modifications.

This final determination, and all comments are available for public inspection at the NCDAQ Central Office in Raleigh and/or the NCDAQ Fayetteville Regional Office.

APPENDIX "A"

Division of Air Quality PM2.5 Policy (December 10, 2009)

NCDENR
North Carolina Department of Environment and Natural Resources
Division of Air Quality

Beverly Eaves Perdue, Governor

Dee Freeman, Secretary
B. Keith Overcash, P.E., Director

December 10, 2009

TO: Section Chiefs
Regional Supervisors

FROM: Keith Overcash

SUBJECT: PM2.5 NSR Transition Policy

In 1997 the EPA established a National Ambient Air Quality Standard ("NAAQS") for PM2.5. At that time the EPA issued a memorandum outlining the transition towards implementing the new ambient standard. "*Interim Implementation for the New Source Review Requirements for PM2.5.*" John S. Seitz, EPA, October 23, 1997. The Seitz transition policy established the use of the existing PM-10 NSR program provisions as a transitional surrogate for implementation of the PM2.5 NSR requirements. EPA's decision to use PM-10 as a surrogate was based on certain difficulties in implementing PM2.5 directly including the lack of necessary tools to calculate the emissions of PM2.5 and related precursors, the lack of adequate modeling techniques to project ambient impacts, and the lack of PM2.5 monitoring data.

In 2005 the EPA issued a guidance memorandum entitled "Implementation of New Source Review Requirements in PM-2.5 Non-Attainment Areas." This memorandum reaffirmed EPA's 1997 transitional policy.

In 2008 the EPA issued its final PM2.5 NSR Implementation Rule. That rule, codified at 40 CFR §51.21, is directly applicable in jurisdictions with delegated NSR programs. Jurisdictions with fully approved programs are required to revise their existing programs, as necessary, to conform to the minimum acceptable program elements at 40 CFR § 51.166. North Carolina has started this rulemaking process. However, until the rulemaking is complete, the NCDAQ is establishing this transition policy in order to more effectively and efficiently implement the PM2.5 NSR elements.

PM2.5 Modeling
For any project that is a new major stationary source of primary PM2.5, or for an existing source that proposes a modification that results in a significant emissions increase of primary PM2.5, the source will be required to demonstrate compliance with the national ambient air quality standard for PM2.5 as adopted by North Carolina at 15A NCAC 2D .0400. This demonstration shall be performed based on the source's primary PM2.5 emissions and shall use the most representative available PM2.5 ambient monitoring background concentration. The facility will not be required to include off-site inventory at this time. This transitional modeling procedure will be reviewed as more reliable PM2.5 inventory data become available or when EPA issues a final PM2.5 modeling rule.

PM2.5 Precursors
In the PM2.5 NSR Implementation Rule, the EPA established that because SO2 "is a significant component (e.g., ranging from 9 percent to 40 percent) of [ambient] PM2.5 concentrations, and contributes to other air quality problems in all regions of the country" that SO2 would be regulated as PM2.5 precursor pollutant. With

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Division of Air Quality PM2.5 Policy (December 10, 2009)

respect to oxides of nitrogen ("NOx"), although nitrate concentrations varied significantly across the country, the EPA provided a rebuttable presumption that NOx is a PM2.5 precursor pollutant.

North Carolina is proposing that both SO2 and NOx be considered precursor pollutants to PM2.5 formation.

Significant Emission Rates
The determination of whether a modification is subject to major PSD review is based, in part, on whether there is a significant emissions increase. Activities which do not result in an emissions increase above the significance level are considered de minimus. In the PM2.5 NSR Implementation Rule, the EPA established a direct PM2.5 significance rate base of 10 tons per year by determining the size of a source of direct PM2.5 emissions that would be expected to have an ambient impact of four percent or more of the NAAQS.

North Carolina believes this is a reasonable approach for direct PM2.5 and therefore is establishing, for the purposes of this transitional period, a direct PM2.5 significance rate of 10 tons per year. The significant emissions rate for SO2 will remain at 40 tons per year while the significant emissions rate for NOx will be set at 200 tons per year. The difference in the significant emission rates of the secondary precursors (SO2 and NOx) reflects the relative import of the pollutants with regard to secondary PM2.5 formation. *See* 75 Fed. Reg. 28321 at 28339. *See also* August 2009, The Hickory and Greensboro/Winston-Salem/High Point, NC PM2.5 North Carolina Attainment Demonstration; Section 2.0 SIGNIFICANCE OF PM2.5 PRECURSOR POLLUTANTS (http://daq.state.nc.us/planning/PM2.5_SIP_Narrative_08212009.pdf).

Condensable PM Emissions
In the PM2.5 NSR Implementation Rule, the EPA established that only after January 1, 2011, would condensable emissions be required to be included in determining rule applicability. However, North Carolina already requires that condensable emissions be considered in determining applicability and compliance. See 15A NCAC 02D .2609.

Best Available Control Technology
In the PM2.5 NSR Implementation Rule, the EPA established that if a physical or operational change at an existing major source would result in a significant emissions increase and a significant net emissions increase of a regulated NSR pollutant in an attainment area for that pollutant, the source must apply BACT to each proposed emissions unit. Under the PM2.5 PSD program, these requirements will apply to direct PM2.5 emissions, SO2 emissions, and NOX emissions.

The NCDAQ will require BACT for primary PM2.5, SO2, and NOx when a project triggers PSD review for PM2.5.

cc: Sheila Holman
Mike Abraczinskas
John Evans
William Willets

APPENDIX "B"

Fugitive Dust Modeling with AERMOD for PM10 Emissions From a Municipal Solid Waste Landfill

Fugitive Dust Modeling with AERMOD for PM10 Emissions from a Municipal Waste Landfill

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ABSTRACT

This paper discusses issues and challenges addressed during a project to calculate and model fugitive dust and PM10 emissions from a large municipal solid waste (MSW) landfill located in eastern Oregon. The model selected for the study, which was completed in 2004, was AERMOD Version 02222. AERMOD Version 04300 was promulgated by USEPA as a regulatory model in the *Guideline on Air Quality Models*[1] on November 9, 2005.

To permit a planned facility expansion, the Oregon Department of Environmental Quality (ODEQ) required the facility to complete an air quality impact analysis for PM10 emissions. Total PM10 emission increases, including fugitive dust emissions from haul trucks on paved and unpaved roads and from landfill waste handling, were required to be included in an ODEQ (state-only) Prevention of Significant Deterioration (PSD) analysis.

Important project issues and challenges included utilizing appropriate methods to calculate fugitive PM10 emissions for input to modeling using USEPA AP-42 Section 13, selecting AERMOD source parameter inputs, and processing representative meteorological and site characteristic data inputs. An important up-front modeling data input issue was the PM10 emission calculation methodology. Given the planned large number of haul trucks entering the facility, PM10 emissions calculations, and thus modeled impacts, were highly uncertain and sensitive to roadway length, roadway silt content, proposed dust suppression techniques, and other assumptions employed.

Passing the PM10 PSD increment threshold values was challenging. Multiple project refinements and detailed justification was made in the Air Quality Modeling Report to show compliance with ODEQ standards. Refinements are discussed in detail in the paper.

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Going beyond experience with the eastern Oregon landfill, this paper examines regulatory and technical issues associated with regulating fugitive dust emissions in air permits. The role of state agencies in applying dust control measures or requiring modeling is examined. Challenges of modeling fugitive PM10 emissions with AERMOD are discussed, including developing input source parameters (area and volume sources), establishing average hourly emission rates, issues with source and receptor elevation inputs, meteorological data processing, and use of deposition algorithms.

INTRODUCTION

This paper discusses the regulatory and technical issues with using AERMOD to model impacts from fugitive PM10 emission sources at municipal solid waste (MSW) landfills. In 2003 and 2004, SCS Engineers and BlueScape Environmental teamed to complete a challenging PM10 modeling study for a landfill located in eastern Oregon. Fugitive PM10 emission sources included paved and unpaved roads, storage piles and waste material handling operations. The specific facility is not named due to ongoing permit negotiations.

The landfill is a Title V facility, but is excluded from federal Prevention of Significant Deterioration (PSD) source applicability. Nonetheless, because planned emission increases would exceed PSD significance thresholds, the Oregon Department of Environmental Quality (ODEQ) cited authority under state air quality regulations to require a "state-only" PSD modeling study. The landfill was required to show compliance with the National Ambient Air Quality Standards (NAAQS) for PM10 which are equivalent to the Oregon Ambient Air Quality Standards (OAAQS). The facility was also not allowed to exceed the PSD PM10 increment thresholds.

At the time, ODEQ was in the forefront of state air agencies, in that AERMOD was already the regulatory model of choice. The project team expected the PM10 modeling study to be challenging from the outset. Many tons of fugitive PM10 emissions were calculated for haul roads located within 200 meters of the facility property line, or the location of "ambient air." This situation is common, since entry and exit haul roads with the greatest traffic and PM10 emissions often run close to the facility boundary. As discussed in the paper, initial modeling results exceeding the 24-hour average PM10 increment threshold by more than four times, were reduced to below that threshold, using refinements and many AERMOD modeling iterations.

The first section of this paper presents an AERMOD case study, involving the eastern Oregon landfill. The second section provides details on current regulatory policies and technical issues regarding fugitive PM10 modeling and AERMOD. The focus of this paper is on mechanically generated PM10 emissions from haul roads. Uncertainty with using standard USEPA emission calculation methods, and use of AERMOD technical options to model these sources are described. The last section presents recommendations on how industrial facility staff, regulators, and modelers should assess potential impacts from proposed permitted fugitive PM10 emissions increases, and addresses the question - to control, model, or both?

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MODELING FUGITIVE PM10 AT A LANDFILL - A FEW BAD DAYS

This section recounts experience using AERMOD to complete a fugitive PM10 modeling study. From the period September 2003 through September 2004, SCS Engineers and BlueScape Environmental completed the study for a MSW landfill located in eastern Oregon. The active landfill occupies 647 acres of a 2,000 acre property. The ODEQ was notified of increases in estimated facility fugitive Total Suspended Particulate (TSP) and PM10 emissions. The emissions were expected to increase due to a change in emission calculation methods and a proposed increase in waste intake.

The majority of total calculated PM10 emissions (80%) were from heavy truck traffic on paved and unpaved roads, and material handling activity in the main landfill area. Much of the those emissions, initially about 48 tons/year (68%), were estimated to be from trucks on the paved (PRD) and unpaved (MHR) sections of the Main Haul Road, and from "goats" that haul waste from railcars on the Main Haul Road to the Material Handling Area. PM10 emission estimates at the outset of the modeling project, and after completing emission calculation refinements are shown in Table 1.

Table 1. Summary of Landfill PM10 Emissions Before and After Refinement

Emission Source	Initial Estimates[1]		Refined Estimates[2]		Difference (%)	
	PM10 (lb/day)	PM10 (tons/yr)	PM10 (lb/day)	PM10 (tons/yr)		
Paved Main Haul Road (PRD)	170.4	27.3	76.2	10.7	-55	-61
Unpaved Main Haul Road (MHR)	53.6	8.6	82.6	11.4	54	33
Unpaved Access Road (UPR)	10.7	1.7	12.9	1.8	21	6
Unpaved Railyard Road	74.6	11.9	33.4	4.8	-55	-60
Material Handling	48.7	7.6	74.6	11.6	53	53
Wind Erosion	16.3	2.5	32.5	5.9	99	136
Engines	5.6	0.7	5.1	0.7	-9	0
LFG Flare	55.2	10.1	85.2	15.6	54	54
Total	***435.1***	***70.4***	***402.6***	***62.5***	***-7***	***-11***

[1]As submitted with the Modeling Protocol, September 2003.
[2]As provided in response to ODEQ comments on the Modeling Report, September 2004.

Figure 1 shows an aerial photograph of the landfill and select PM10 emission sources. Figure 2 shows a site plan and graphical rendition of modeled PM10 emission sources.

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Figure 1. Aerial Photograph of the Eastern Oregon Landfill

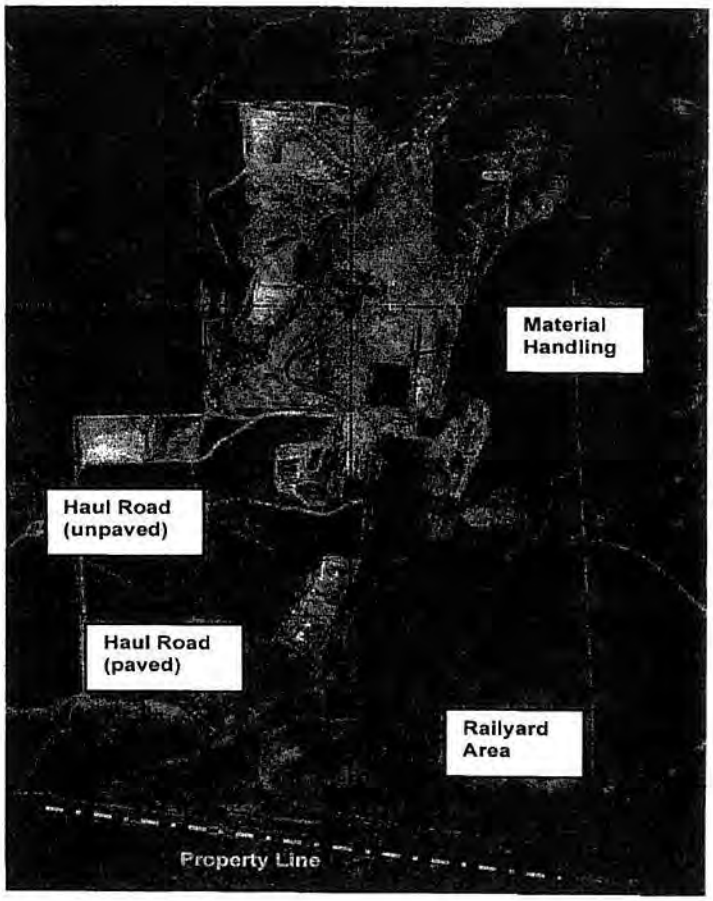

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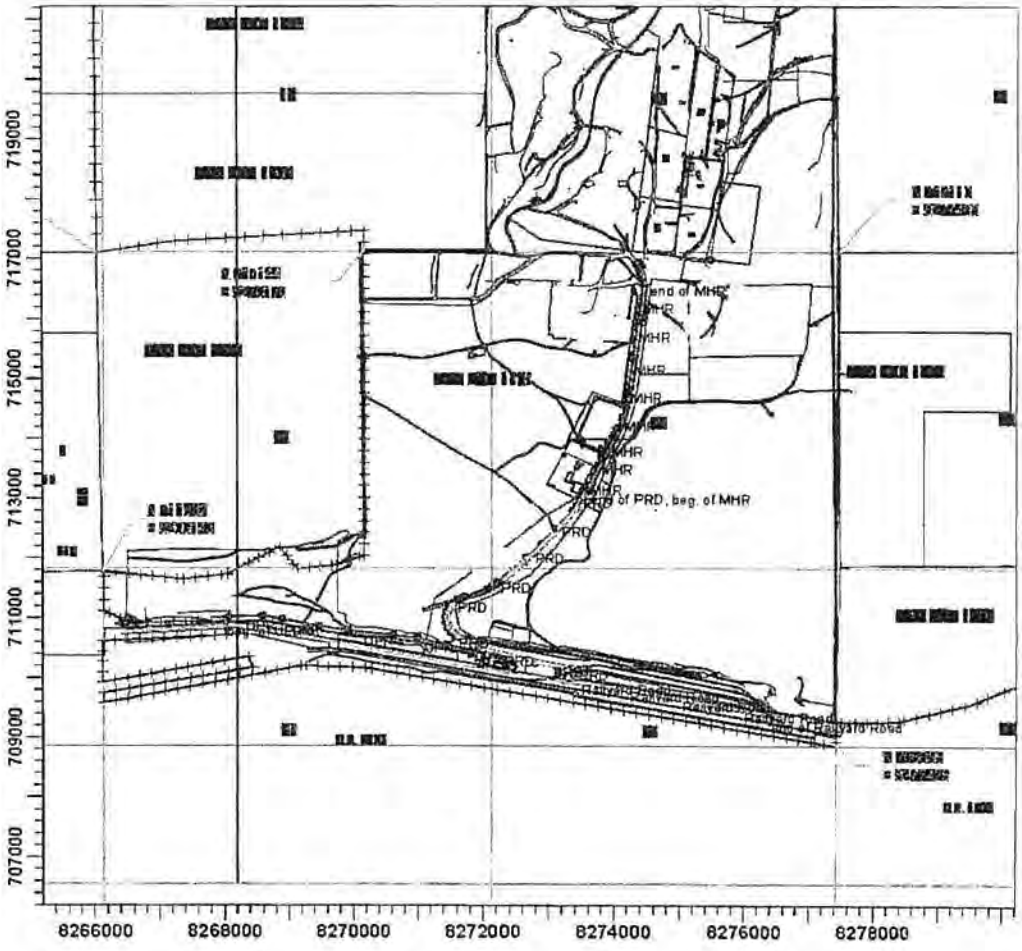
Figure 2. Map of Landfill Showing Modeled PM10 Emission Sources



Federal PSD modeling requirements were not triggered. MSW landfills are not one of the 28 source categories that must consider fugitive PM10 emissions increases for federal PSD applicability. Nonetheless, due to the fact permitted TSP and PM10 emissions were to increase substantially at a Title V facility, ODEQ required a "state-only" PSD modeling study. The facility was required to compare modeled impacts with the PM10 modeling significance thresholds, the OAAQS, which are equivalent to the NAAQS, and the PSD increments. A summary of these standards is provided in Table 2. As shown, the modeling significance levels requiring full impact modeling (*i.e.*, the significance thresholds that requires full modeling to

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show compliance with the AAQS and increments) are a factor of 5 times lower in Oregon as compared to the federal levels. Generally, this would mean modeling fugitive emission sources would be more likely to trigger full impact modeling.

Table 2. Federal and Oregon PM10 Modeling Thresholds ($\mu g/m^3$)

Averaging Period	Federal			Oregon		
	Significance Threshold	Class II Ambient Standard	Increment Threshold	Significance Threshold	Class II Ambient Standard	Increment Threshold
24-hour	5.0	150	30	1.0	150	30
Annual	1.0	50	17	0.2	50	17

Because ambient PM10 impact modeling had not been completed for the facility, ODEQ required all PM10 emissions (not just the proposed increases) to be considered for the modeling study, including truck traffic on paved and unpaved roads, material handling storage piles, diesel engines, and a landfill gas flare.

PM10 emissions were calculated using default USEPA methods from AP-42 Section 13. Silt sampling was conducted at roads to provide for more accurate PM10 emissions estimates. Silt loading averaged about 4.1 g/m^2 on the paved road, and 54.9 g/m^2 on the unpaved Main Haul Road. Vehicle average truck weights, speeds and daily and annual vehicle miles traveled were estimated from a diverse fleet mix. Material Handling emissions were based upon estimates of total daily and annual waste disposal and earth movement amounts, with rainfall and wind data representative for the area. Paved Main Haul Road emissions were assumed to have 79% cumulative emissions control from watering and sweeping. Unpaved Main Haul Road emissions were assumed to have 88% cumulative emissions control from watering and chemical suppressants. Railyard Road emissions were assumed to have 80% cumulative control from watering and gravel coverage.

The modeling study utilized AERMOD Version 02222 that was current at the time. A Modeling Protocol was submitted to ODEQ in September 2003 and approved. Following ODEQ guidance, baseline modeling was complete using AERMOD and area sources for fugitive road, storage pile and material handling PM10 emission sources. The maximum baseline PM10 concentrations from modeling were in compliance with the NAAQS and OAAQS. The baseline modeling also showed compliance with the PM10 annual average increment threshold, 17 $\mu g/m^3$.

However, the baseline maximum 24-hour average PM10 concentration, 125 $\mu g/m^3$, exceeded the increment threshold, 30 $\mu g/m^3$ by more than a factor of four. Examination of model results by source showed high impacts due to PM10 emissions from only a few segments of the paved and unpaved main haul road, and from the unpaved Railyard Road. These impacts occurred on only a few "bad" days, in a highly localized area extending for about 200 meters from the southern landfill property line. That property line is at the location of a remote county road with no local

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residences or businesses along the road. On the maximum impact days, 24-hour average PM10 concentrations were dominated by notably high impacts during only a few one hour periods. The modeled one-hour average values ranged on the order of 200 to 500 $\mu g/m^3$. The high one-hour average impacts occurred during very stable atmospheric conditions with light winds. Low surface friction velocity and stable boundary layer (SBL) depth values were noted in the meteorological data file for these hours.

Sensitivity analyses were completed in earnest by updating emissions estimates and changing AERMOD input source parameters. At this point after many iterations, the refined maximum PM10 24-hour average concentration was reduced to 62 $\mu g/m^3$, still more than twice the increment threshold. The project team contacted ODEQ and provided initial modeling results. Given that dominant 24-hour average impact results from AERMOD occurred on only a few bad days in a localized area, the project team requested that ODEQ require only the annual average PM10 impacts to show compliance with the PSD increments. ODEQ refused this request, but recommended that the project team continue to work on refinements to the modeling study.

Following ODEQ direction, considerable work was continued to work with AERMOD to refine the 24-hour PM10 concentration values. The following techniques (and more) were considered:

- Modeled multiple line (volume) sources in AERMOD instead of area sources;
- Used ISCST3 instead of AERMOD;
- Increased the haul road effective source release height and dilution depth to account for vertical emissions dilution from moving trucks;
- Increased the haul road effective width to account for horizontal mixing;
- Refined emission estimates to account for greater dust suppression, refined the average number of truck trips and trip lengths, and used more accurate road length estimates;
- Refined the area source configuration for the Railyard PM10 emissions;
- Located the property line more accurately;
- Apportioned emissions throughout the day according to traffic volume, versus equal hourly emission rates for each hour of the 24-hour operations day;
- Refined receptor and source input elevations;
- Ignored modeled hours with measured precipitation as potential emission hours;
- Ran plume depletion from dry deposition using the beta version of AERMOD, Version 03273.

ODEQ was supportive of reasonable refinements. Although such techniques as using line sources and ISCST3 lowered impacts, lacking EPA guidance to change protocol, the project team decided to follow ODEQ guidance and stay with using area sources and AERMOD to model fugitive PM10 emission sources. Much of the modeling refinement that was completed was to recalculate fugitive PM10 source emissions. A shown in Table 1 above, emission estimates for the Paved Road and Railyard Road were reduced substantially, by about 55% to 60%. PM10 emission increases from the unpaved Main Haul Road, Material Handling and the landfill gas flare due to ODEQ comments did not have an appreciable impact on the study conclusions. Impacts were also lowered substantially by accounting for initial horizontal and vertical mixing of PM10 emissions on haul roads.

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The final modeling study submitted to ODEQ showed compliance with the PM10 standards and thresholds, just passing the PM10 24-hour increment value with 28.6 µg/m3. The modeling report was submitted to ODEQ in June 2004.

FUGITIVE PM10 MODELING WITH AERMOD - REGULATORY POLICY ISSUES AND TECHNICAL CHALLENGES

This section discusses current regulatory policies, and technical challenges with using AERMOD to complete dispersion modeling for air quality impact analyses. The focus of this section is on fugitive PM10 emissions from paved and unpaved roads. However, much of the discussion can also be applied to storage pile and material handling emissions at landfills, as well as fugitive emission sources in other industries.

Regulatory Policies Regarding Fugitive Dust Control and Air Quality Modeling at Landfills

USEPA and state air agencies in the United States have long recognized that regional fugitive dust and PM10 emissions can contribute to health problems in the public at large. Many state and local air agencies have enacted rules or policies to control fugitive dust emissions. These rules or policies generally focus on the physical methods to reduce dust emissions generation. Agencies may term these methods as Best Available Control Methods (BACM) or Reasonably Available Control Methods (RACM).

Under federal and state new source review (NSR) rules, air quality modeling is commonly required to permit new or modified permit units. This is especially true for major sources. Fugitive PM10 emissions, especially generated by traffic at a stationary source, may or may not be included in permits. Thus, modeling requirements for fugitive sources will vary by agency jurisdiction.

The following are possible instances where dispersion modeling for fugitive PM10 sources may be required by a state or local agency:

1. The agency requires a Title V or major NSR source to show compliance with the federal or state PM10 AAQS and increment thresholds, including the possible impact from nearby background and competing emission sources;
2. State guidelines require air dispersion modeling for emission increases (including roadway emissions) from minor sources;
3. An air toxic health risk assessment is required, to consider potential community exposure to metals in fugitive dust emitted by a facility;
4. An agency requires an ambient air quality impact analysis for an environmental impact report (EIR) completed under the California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA);
5. A facility operator chooses not to follow BACM to control dust emissions, but rather, opts to show compliance with the ambient air quality standards using modeling.

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Many municipal waste landfills in the United States are categorized as Title V facilities, although they do not meet the definition of a federal major source. This is due to the fact that the NSPS for Municipal Solid Waste Landfills (40 CFR Part 60, Subpart WWW) also triggers Title V applicability. As stated previously, for MSW landfills, the Part 70 Title V rules exclude fugitive emissions from major applicability. Nonetheless, state air agencies can have jurisdiction and the discretion to require air quality modeling when significant expansion and increase in PM10 emissions above current permit limits is expected. Regulatory air quality modeling requirements for major source and minor source projects are more likely to be triggered in attainment areas where states are striving to maintain good air quality.

In the more serious PM10 nonattainment areas, such as in Phoenix, Arizona, the South Coast Basin in Southern California, Clark County, Nevada and the San Joaquin Valley in California, agencies have set stringent fugitive dust emission control requirements. Interestingly, these agencies do not require stationary source facilities such as landfills to show compliance with the AAQS. Rather, these agencies utilize implementation of BACM as the best way to reduce PM10 emissions and to achieve compliance with the AAQS on a jurisdiction-wide basis. Examples include San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) Rule 8061 for paved and unpaved roads, and South Coast Air Quality Management District (SCAQMD) Rules 403 and 1186 for fugitive dust and roads.

EPA AP-42 Sections 13.2.1 (paved roads) and 13.2.2 (unpaved roads) list methods for controlling particulate emissions generation and dispersion from haul roads to off-site areas. These sections can be found at http://www.epa.gov/ttn/chief/ap42/ch13/index.html. Some of the methods include:

- Covering truck loads;
- Paving;
- Vacuum sweeping and broom sweeping;
- Water flushing or applying chemical suppressants;
- Installing berms and planting vegetation along roads;
- Limiting the number of vehicles, vehicle weight, distance or speed traveled.

The emission control efficiencies from these techniques can vary widely. AP-42 states that the commonly used watering technique can reduce emissions from unpaved roads by up to 100% by keeping the soil saturated. However, such control requires a tremendous amount of a precious resource (water) and fuel for watering trucks. Applying chemical suppressants can be costly and also have an environmental impact. If an agency will support modeling to show compliance with ambient air quality standards and/or protection of increments, then modeling might be more attractive than controls. By its very nature, an active landfill will expand in size and capacity with population growth. Landfill operators will generally not want to take operational restrictions

In Texas, a combination of BACM and air quality modeling may be employed to control fugitive PM10 emissions from fugitive sources, depending upon the stationary source type. The Texas Commission on Environmental Quality (TCEQ) *Modeling Guidelines* specifically state that road emissions should not be included in permit modeling analyses for short-term averaging periods,

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that is, less than the annual averaging period[2]. Annual modeling should not be completed if the emissions cannot be accurately quantified, or if best management practices are used to control emissions. TCEQ states, "combined with worst-case operating scenarios, the modeling tool [referring to ISCST3] will overpredict concentrations, particularly in the vicinity of the source, and may incorrectly identify road emissions as the major cause of air pollution at a site. Often the use of control measures and best management practices are the most effective means to address off-property impacts from road sources." TCEQ developed a factor, 0.6, to be applied to ISCST3 and SCREEN3 model results to reduce the potential for overprediction[3]. As for use of AERMOD for fugitive PM10 emissions modeling, the TCEQ website states that this adjustment factor is not allowed, since AERMOD has better treatment of stability parameters than ISCST3. However, the website does not currently have guidance on implementation of AERMOD for these sources.

Regulatory Use of AERMOD for Fugitive PM10 Emissions Modeling

Dispersion modeling to show compliance with regulatory standards is generally completed using regulatory models following EPA's *Guideline on Air Quality Models*[1] and written state guidelines or policy memoranda. Until December 9, 2005, ISCST3 was the regulatory model of choice in the United States. ISCST3 has a tendency to overestimate impacts from low-level PM10 emission releases. A study completed for the coal mining industry has shown that ISCST3 overestimates impacts by at least a factor of two[4]. A study referenced in that document submitted to the National Stone, Sand and Gravel Association (NSSGA) showed that ISCST3 predicted PM10 concentrations in the range of 0.87 times to 5 times monitored values.

According to USEPA, AERMOD is a better regulatory model than ISCST3 for a number of reasons[5]. For example, AERMOD has better treatment of vertical plume dispersion. For point and volume sources, the accounting for plume meander is a significant improvement. However, for low-level emission plumes, AERMOD has not been evaluated extensively by USEPA for performance against measured data, nor compared to ISCST3 modeling results. AERMOD will treat emission plumes from roadways as uniform for a given hour, when in actuality, these plumes are quite transient. While AERMOD may perform well as a regulatory model for source scenarios evaluated to date, AERMOD may or may not be reliable for modeling fugitive emission impacts. More formal evaluation by USEPA is needed.

Challenges of Modeling Fugitive PM10 Impacts with AERMOD

In modeling fugitive PM10 emission impacts with AERMOD, there will be assumptions made, uncertainties realized, and challenges faced. A number of questions might arise. How will PM10 emissions be calculated and what emission control techniques (at what control efficiency) must be considered for the emissions? Are these control techniques BACM, RACM, or optional, and what are the costs? When employing emission controls, should the agency waive modeling requirements for 24-hour average or annual average PM10 impacts? What is your justification, if this is your proposal? Does the state air agency have authority to decide that you must conduct modeling? How will you input emissions data and source parameters into AERMOD in a manner that will be technically accurate and not overly conservative? How will you properly characterize the meteorological data and surface characteristics that effect low-level dispersion?

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Should you consider PM10 monitoring to verify that PM10 emissions do not cause the problems shown by modeling? Why not just conduct PM10 monitoring rather than modeling?

Challenge #1 – Characterizing Fugitive PM10 Emissions Modeling Inputs

To model fugitive PM10 emission impacts, AERMOD requires input average PM10 emission rates. Landfill owners and consultants faced with calculating fugitive PM10 emissions typically use USEPA AP-42 Section 13 calculation methods. For landfills, the most relevant sections are Section 13.2.1 (Paved Roads), Section 13.2.2 (Unpaved Roads), and Section 13.2.4 (Aggregate Handling & Storage Piles)[6]. These sections are currently under revision to update the emission calculation methods for PM2.5.

For MSW landfills, the focus is likely on PM10 emissions from paved and unpaved haul roads. Relatively high traffic volumes are common. For emissions per vehicle mile traveled (lb/VMT), the key inputs are average vehicle weight, distance traveled, surface silt content, particle size factor, and emissions from break and tire wear. Note that the paved road PM10 emission equations do not build in an assumption for average vehicle speed, even though greater speeds would be expected to generate higher emissions. The unpaved road empirical emission equations do require the mean vehicle speed and also the surface material moisture content.

A good degree of uncertainty exists with these empirically derived emissions calculation methods. The calculations are sensitive to silt loading (mass of silt-sized material per unit area of travel surface). Silt loading is site-specific and even road-specific, and thus, often requires site measurements to provide a realistic value. Uncertainty is also introduced when calculating average vehicle weights and speeds. Municipal waste trucks and on-site waste haul trucks ("goats") vary widely in size and loaded weight entering landfills. On return trips, the average vehicle weights will be much less than fully loaded weights. Vehicle traffic volume can vary widely during a 24-hour day, which can impact the hourly PM10 emissions profile. The fully-loaded vehicle speeds would be expected to be much less than the unloaded vehicle speeds, especially when vehicles climb up a landfill slope. Thus, the average vehicle weights and emissions generation per square meter per day for haul roads must take into account this variability. Daily and hourly emissions are estimated based upon fleet averages.

Challenge #2 – Developing AERMOD Source Parameter Inputs

AERMOD was recently promulgated as the new regulatory model to replace ISCST3. While the plume transport equations have been improved, modeling source parameter input requirements for fugitive (non-point) sources have changed little. AERMOD will be widely applied and required for all types of emission releases including low-level fugitive PM10 emission releases. The modeler must understand how AERMOD model source parameter inputs will have bearing on impact study results.

To properly apply AERMOD and develop model inputs, one must understand the physical situation modeled. Take, for example, mechanically generated fugitive PM10 emissions from a haul road. As a large truck passes, a cloud of dust emissions will be picked up behind the truck and dispersed downwind for a brief period. Some of that cloud will consist of PM10 emissions.

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The plume will have some initial vertical depth and lateral spread behind the truck. Heavier material will fall out quickly due to gravity, Brownian motion, and interaction with surface features. The plume centerline will descend toward the ground, at a rate that depends upon the atmospheric stability, soil composition and other factors. Smaller particles such as PM10 will be deposited further downwind from the source.

Area Versus Volume Source Configuration for Haul Roads

For haul roads and other fugitive emission sources, an important choice to make is whether the source should be modeled as an area or volume source. Written state air agency modeling guidelines may require that haul roads be modeled either way. Missouri, Nebraska, Nevada, Utah, South Carolina, and Vermont recommend that haul roads be modeled as area sources[7]. New Mexico, South Carolina, North Carolina, Oklahoma, and Texas suggest that haul roads be modeled as volume sources. Louisiana recommends modeling roads as a series of point sources. In the case of Oregon, ODEQ has shown preference for modeling roads as area sources. The *Guideline on Air Quality Models* 5.2.2.2(e)[1] states that roads can be modeled as either line, area, or volume sources. Where published guidelines or policies do not state a preference, the modeler will have some flexibility to state an approach. State guidelines will no doubt be updated as air agencies become more familiar with AERMOD.

To develop AERMOD inputs for a haul road as a series of area sources, the emissions flux in g/sec-m^2, source release height above ground, horizontal dimensions (x and y), and initial vertical plume dilution (σ_z) are required[8]. The *AERMOD User's Guide* recommends that an area source length be no greater than 10 times the area source width. For a long haul road, this can require many area source inputs and long model run times. AERMOD inputs for volume sources (or a line source consisting of adjacent volume sources) include the emissions rate in g/sec, source release height above ground, and the initial lateral (σ_y) and vertical (σ_z) plume dimensions.

Little guidance can be found from state agencies on how to develop the lateral and vertical source parameter inputs, σ_y and σ_z. For haul roads, the TCEQ recommends that volume sources have a source depth equal to two times the height of the vehicle generating emissions, with a source release height at half of that depth[2]. TCEQ recommends that the adjusted width of a haul road be the actual width plus 6 meters. A study prepared for the National Stone, Sand and Gravel Association (NSSGA) titled *Modeling Fugitive Dust Sources* recommends that haul roads be modeled as area sources or volume sources with initial plume depth equal to two times the height of the vehicle generating the emissions, with source release height one half that depth[7]. In that study, the recommended adjusted road source width is the haul road width plus 9.75 meters. The (σ_z) parameter would be calculated as the initial plume depth divided by 4.3.

The *AERMOD Implementation Guide*[9] states that the modeler should exercise caution when using the area source algorithm with low-level emission sources. Plume meander has not been included for area sources to date due to issues with excessive run times. The guidance states that concentrations from area sources may be overestimated during very light wind conditions. This was likely the case with the eastern Oregon landfill modeling study, which was completed prior to inclusion of plume meander in AERMOD. The guidance recommends that volume sources be

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used instead of area sources for light wind conditions. If area sources must be used, the guidance recommends consulting the regulatory agency about possibly excluding high concentration hours as missing data.

Operating Schedule, Emissions Inputs and Hour-of-Day Scaling Factors

The minimum concentration averaging time in AERMOD is one hour. The 24-hour average concentrations are calculated from one-hour average concentrations. PM10 emissions from haul roads at landfills are variable. The emissions can vary by time-of-day, by season, and within each hour. The emissions profile will change as the landfill surface changes, as haul roads and material handling areas change location. On unpaved roads, vehicle speeds might vary over different lengths of a haul road.

The simplest modeling approach would be to divide all average daily or annual emissions calculated for haul road sources equally into the area or volume sources that represent that road. For planning purposes, and to more closely match emissions to daily peak periods and meteorology, a refinement would be to use hour-of-day or seasonal scaling factors. If a landfill only operates during daytime hours, the hour-of-day scaling factors with only daytime emission inputs would be appropriate since emissions cannot occur at night.

Source and Receptor Terrain Elevations

When fugitive PM10 sources such as haul roads are relatively close to modeled receptors, AERMOD results may be very sensitive to relative source-receptor elevation differences. State agencies often require source and receptor terrain elevations to be included in modeling. However, this requirement may not make sense for fugitive PM10 emission releases near ground level.

Under higher wind speeds and unstable atmospheric conditions, a fugitive dust plume might maintain appreciable height above ground and be dispersed rapidly downwind. These are seldom the conditions that will drive maximum modeled impacts. Under low wind speeds and stable conditions, dust plumes are likely to "hug" the ground and interact closely with ground features.

One must consider whether relative elevations have an important, and possibly unrealistic, impact on the modeling study results. The *AERMOD Implementation Guide*[9] suggests that, if terrain is included, AERMOD might underestimate concentrations in gently downsloping terrain. Similarly, AERMOD might overestimate concentrations in upsloping terrain for certain source configurations. In both cases, modeling may not accurately account for interaction of the plume with surface features such as vegetation, berms and fences (see below for more discussion). On a case-by-case basis, modeling using a flat terrain assumption may be the most appropriate procedure.

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Meteorological Input Data and Surface Characteristics

AERMOD requires input meteorological data and description of surface characteristics. Surface characteristics include surface roughness (z_o), albedo, and Bowen ratio. Atmospheric stability parameters are calculated from AERMET for input to AERMOD from the input surface meteorological data, upper air data, and surface characteristics.

A number of papers have been published stating the sensitivity of AERMOD modeling results to the surface roughness parameter. Surface roughness can be estimated for an area from USGS land use land cover (LULC) files, referenced from the *AERMOD User's Guide*, or measured at the site. When using AERMOD for fugitive PM10 emission releases, the user must consider whether the surface roughness value adequately accounts for the microscale interaction of the plume with features such as vegetation, walls, fences, and berms that commonly exist along facility property lines and near haul roads. Raising the surface roughness factor relative to the overall background surface roughness may be appropriate.

Surface wind speed data are typically obtained from the 10-meter tower level, with data extrapolated to source emissions level using the wind profile equation. Under stable, light wind conditions, there can be considerable uncertainty in the wind speed values extrapolated to near ground level. Data from a two-meter tower might be more appropriate. This level was used to evaluate AERMOD performance with Prairie Grass data for a low-level point source release[10]. Model results occurring under hours with light winds and very low calculated surface friction velocity (u_*) values should be viewed skeptically. It may be appropriate to remove hours with relatively high concentration values from the modeling study, and from the reported 24-hour average concentration impacts. The modeler should also look at the meteorological data file, and consider whether modeled hours with precipitation and saturated conditions can be removed from consideration.

Deposition

Deposition is an important effect that can lead to rapid concentration depletion in a fugitive PM10 emissions plume. The PM10 deposition velocity is about 0.3 cm/sec, which means that PM10 will deposit out of a plume located one meter above ground in about 1 kilometer with a 3 meter/second wind speed[11]. The effect of deposition on plume depletion is an obvious technical refinement that should be considered.

However, there are issues associated with using deposition in AERMOD. First, the dry and wet deposition algorithms are considered draft in AERMOD Version 04300 and optional. There is uncertainty associated with determining a representative particle density for the particulate emissions plume including the PM10 portion.

The author's experience is that only marginal concentration reduction will result from using dry deposition when sources are close to receptors. Experience with the eastern Oregon landfill study showed only a 5% to 10% reduction in the PM10 plume concentration. Wet deposition with AERMOD was not available during the case study.

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RECOMMENDATIONS AND CONCLUSIONS: CONTROL, MODEL, OR BOTH?

This section provides recommendations and conclusions applicable to fugitive PM10 modeling using AERMOD for a municipal waste landfill. Recommendations are organized by regulatory policy issues, and AERMOD technical considerations.

Regulatory Policy and Fugitive PM10 Modeling

From a regulatory policy standpoint, facility operators and agency staff should carefully consider the potential effect of proposed fugitive PM10 emission increases on ambient air quality. While emissions may have a high impact at off-site areas termed ambient air, impacts will usually be highly localized. The actual impacts will drop off rapidly within a short distance from the property line.

Employment of Best Available Control Measures or Reasonably Available Control Measures may be the best option to regulate and control the emissions, whether or not the facilities are located in PM10 nonattainment areas. The control measures include such techniques as watering, sweeping, use of chemical suppressants, and installing fences and vegetation along haul roads. Facility owners in PM10 attainment areas (both major and minor sources) that would prefer not to employ these control measures, might be required by agencies to conduct modeling to show compliance with the PM10 ambient air quality standards and increments.

If a regulatory agency requires fugitive PM10 modeling and impacts are problematic, facility and agency staff should look carefully at the model results and understand whether they are realistic. On a case-by-case basis, AERMOD could overpredict short-term PM10 concentrations. It would not make sense to limit a facility's operations based upon a few bad days or hours. Perhaps only annual average concentration modeling should be required, or facility and agency staff could explore AERMOD technical refinements that might be appropriate for the site.

AERMOD Technical Considerations for Fugitive PM10 Emissions Modeling

The following conclusions and recommendations are provided concerning use of AERMOD for fugitive PM10 modeling:

- Before completing modeling with AERMOD, spend time refining fugitive PM10 emission estimates, especially for sources such as haul roads located close to property line locations. Refinements should account for site-specific silt loading, average vehicle weights, actual average miles traveled, and reasonable, physical techniques to control dust emissions;
- Paved and unpaved road roads can be modeled in AERMOD as line, volume, or area sources. For stable, low wind-speed conditions, use of line or volume sources is preferred to account for plume meander. Line of volume sources will cause significantly less model runtime;

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- Account for initial plume dilution from mechanically generated PM10 sources by increasing the effective source dilution depth and width, and calculating appropriate source release parameters for input to AERMOD;
- Consider the actual emissions profile over the operational day. Hour-of-day emission scaling factors in AERMOD can be used to apportion variable daily emissions;
- When the source-receptor distance is close, consider that inclusion of source terrain might either overestimate or underestimate modeled impacts. The appropriate assumption may be to model terrain as flat in AERMOD;
- The surface roughness value used for modeling with AERMOD should reflect the microscale interaction of low-level fugitive PM10 plumes with surface features. Consider using a higher surface roughness value than area background to account for this interaction;
- Surface wind speed data should reflect the elevation of plume release. Wind speeds extrapolated by AERMOD from higher measurement levels above ground may lead to underestimated wind speeds;
- Wet and dry deposition can be used with plume depletion in AERMOD to reduce calculated PM10 concentrations. The method is currently considered draft and optional;
- The modeler should closely review source impacts and meteorology on worst-case 24-hour PM concentration days. A few unrealistically high hours can dominate 24-hour concentration impacts, and the impacts might be overestimated by AERMOD in hours with low-wind speeds, highly stable atmospheric conditions, and precipitation.
- Given the potential for agencies to place restrictive permit and operational limits on facilities due to fugitive PM10 emissions, USEPA should conduct more extensive AERMOD model evaluation for fugitive sources, and provide better modeling guidance to the regulated community.

This paper should be used as a guide for open discussions between staff at facilities that generate fugitive PM10 emissions and regulatory agency staff. The goal for any modeler facing the uncertain task of using AERMOD to show compliance with regulatory standards should be to have a proactive understanding of the local regulatory policy regarding appropriate fugitive dust control techniques and modeling requirements. If modeling is required, it is incumbent on the modeler to understand the effect that model inputs will have when using AERMOD.

ACKNOWLEDGMENTS

The authors thank Gabrielle Fourie of SCS Engineers for her dedication and hard work running many iterations of landfill TSP and PM10 emissions estimates, and Laurence S. Reider of BlueScape Environmental for his efforts in completing the landfill AERMOD modeling work.

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KEYWORDS

Air dispersion modeling
AERMOD
Fugitive dust
PM10
ISCST3
Area Source
Volume Source
Landfill

NORTH CAROLINA DIVISION OF AIR QUALITY **Air Permit Review – PSD Preliminary Review** Permit Issue Date: Final Permit was issued on May 10, 2010	Region: Fayetteville Regional Office County: Sampson NC Facility ID: 8200139 Inspector's Name: Mitch Revels Date of Last Inspection: 09/08/2009 Compliance Code: 3 / Compliance - inspection
Facility Data Applicant (Facility's Name): Sampson County Disposal LLC Facility Address: Sampson County Disposal LLC 7434 Roseboro Hwy Roseboro, NC 28382 SIC: 4953 / Refuse Systems NAICS: 562212 / Solid Waste Landfill Facility Classification: Before: Title V After: Title V Fee Classification: Before: Title V After: Title V	Permit Applicability (this application only) SIP: 15A NCAC 2D .0524, 2D .1111, 2D .0530 NSPS: Subpart IIII NESHAP: Subpart ZZZZ PSD: CO, NOx, PM/PM10 PSD Avoidance: N/A NC Toxics: HCL 112(r): N/A Other: N/A

Contact Data			Application Data
Facility Contact	Authorized Contact	Technical Contact	Application Number: 8200139.09A Date Received: 05/14/2009 Application Type: Modification Application Schedule: PSD Existing Permit Data Existing Permit Number: 09431T01 Existing Permit Issue Date: 12/07/2005 Existing Permit Expiration Date: 08/31/2009
Bryan Wuester Landfill Manager (910) 525-4132 P.O. Box 640 Roseboro, NC 28382+0640	Bryan Wuester Landfill Manager (910) 525-4132 P.O. Box 640 Roseboro, NC 28382+0640	Bryan Wuester Landfill Manager (910) 525-4132 P.O. Box 640 Roseboro, NC 28382+0640	

Consultant: RST Engineering, PLLC Contact: Butch Smith Phone#: (919) 810-9875 email: butch50@nc.rr.com

Review Engineer: Booker Pullen Regional Engineer: James Moser Review Engineer's Signature: Booker J. Pullen Review Start Date: September 9, 2009	Comments / Recommendations: Issue: 09431T02 Permit Issue Date: Final Permit was issued on May 10, 2010 Permit Expiration Date: August 31, 2009 * * Note: the renewal application was received by the RCO on November 25, 2008 (Jenny Sheppard)

I. Background

Sampson County Disposal, LLC (SCD) operates an active municipal solid waste landfill near Roseboro, North Carolina under Air Permit No. 09431T01. The landfill is the source of air pollutant emissions, and is subject to NSPS in accordance with 40 CFR Part 60, Subpart WWW "Standards of Performance for Municipal Solid Waste Landfills". Subpart WWW requires that landfills above certain size thresholds install landfill gas collection and control systems. The collected landfill gas is required to be ducted to an open flare, gas treatment system, or alternative control system designed and operated to reduce NMOC emissions by 98% or an outlet concentration of less than 20 ppmvd. SCD currently operates one existing open type flare (4700 acfm, 141 mmBtu/hr heat input @500 Btu/cf landfill gas, 4700 scfm, CD-1) for combustion of captured landfill gas (LFG) in compliance with Subpart WWW. The expanding waste disposal area will eventually require that the landfill gas collection and control system to be expanded. The landfill property covers approximately 935 acres bounded by woodlands and farmland.

II. Purpose of application

The purpose of this application is to request the installation of eight 4-stroke, lean burn, 1,600 kW each, landfill gas-fired generators (gensets) for the combustion of collected LFG and the generation of electricity that will be sold to the local utility company. This application (8200139.09A) was received on May 14, 2009, and was considered complete for processing on that date.

Based on projected gas generation rates, the eight new genset units and the flares will be capable of handling all collected LFG anticipated from the landfill over the remaining active life of the landfill, prior to closure and installation of the final cap and LFG collection system. It is anticipated that the gensets will be the primary control device after installation, with the existing flare and new backup flares as secondary control devices. A new landfill gas treatment system (CD-Treatment) will be added to the facility to comply with NSPS Subpart WWW, §60.752 (a)(b)(iii)(C) for the landfill. The landfill gas treatment system should have a filtration rating of 10 microns or less, lower the water dew point of the landfill gas by at least 20 degrees Fahrenheit with a de-watering process, and compress the landfill gas. {The genset units are not being used as control devices and do not have to meet the requirements of §60.752 (a)(b)(iii)(B) for the landfill because the gas treatment system will be installed}.

The new backup flare is being installed to supplement the existing flare for any time periods when the gensets are not in operation, or are being operated at reduced capacity. Actual operation of the flare is expected to be an infrequent occurrence. The existing flare is a permitted 141 mmBtu/hr, 4700 cfm, candlestick-type open flare (CD-1). The proposed backup flare (CD-2) will also be a 141 mmBtu/hr, 4700 cfm candlestick-type open flare. The heating value of the landfill gas is 500 Btu/cf. Based on a typical candlestick flare sizing chart provided by flare vendor John Zink Company LLC, the proposed flare will have an inlet diameter of 16 inches and an inlet velocity of 56 fps at the approximately 4,700 cfm maximum LFG flow rate.

The new smaller, low gas-flow flare (CD-3) is proposed as an operating alternative to the existing large flare (CD-1) and the new large flare (CD-2), to provide the necessary combustion capability for potentially low gas-flow operating scenarios. This flare will be a 21 mmBtu/hr candlestick-type open flare capable of combusting approximately 700 cfm of LFG with a heating value of 500 Btu/cf.

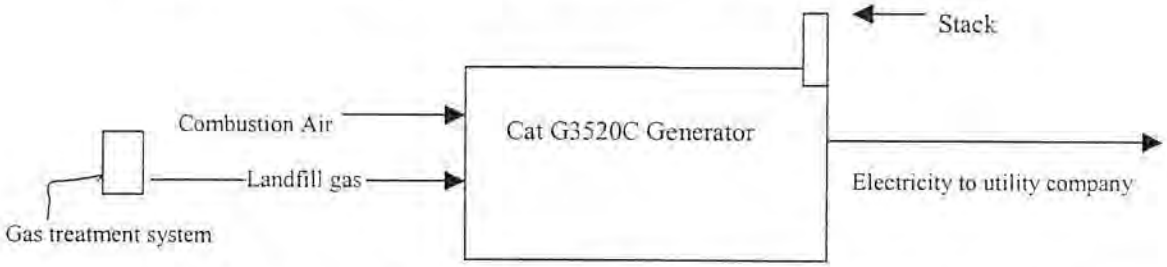
The following sources are proposed:

- Eight genset units (ES-Gen-1 through ES-Gen-8, 1600 kW each, 2233 HP each)
- One utility flare (141 million Btu per hour heat input, 4,700 acfm, CD-2)
- One low gas flow utility flare (21 million Btu per hour heat input, 700 acfm, CD-3)

III. Regulatory Summary

The following is a list of all air quality regulations applicable to the new equipment listed above:

A. Eight landfill gas-fired Genset Units (1600 kW each, 2233 HP output each)



15A NCAC 2D .0516 "Sulfur Dioxide Emissions From Combustion Sources"
This regulation limits sulfur dioxide emissions to 2.3 lbs per million Btu heat input or 13.1 lbs SO_2/hour as calculated below.

1 hp = 42.41 Btu/min genset unit = 2233 hp

$$2233\ hp \times \frac{42.41\ Btu/\min}{1\ hp} = \frac{94{,}702\ Btu}{\min ute}$$

$$\frac{94{,}702\ Btu}{\min ute} \times \frac{60\ \min utes}{1\ hour} \times \frac{1\ mmBtu}{1\times10^{6}\ Btu} = \frac{5.68\ mmBtu}{hour}\ \ per\ engine$$

Allowable SO_2 emission rate → 2.3 lbs SO_2/mmBtu heat input x 5.68 mmBtu/hour = 13.1 lbs/hour

The emission of sulfur oxides, particularly sulfur dioxide (SO_2), from the engines is dependent on the inlet concentration of sulfur-bearing compounds in the landfill gas. The calculation of the estimated SO_2 emissions from each engine is based on the assumption that all of the total reduced sulfur (TRS) in the landfill gas is oxidized to SO_2. Since site-specific data for the TRS concentration in the landfill gas was not provided, SO_2 emissions from the engine were estimated based on the published mean concentration of TRS in landfill gas samples. AP-42 Section 2.4 (revised November 1998) lists concentrations of various compounds in uncontrolled landfill gas. This section reports that the mean concentration of TRS is landfill gas is 46.9 ppmv.

From the application: each engine has an inlet landfill gas flow rate = 30,945 scf/hour (or 15,472.5 scf/hr of methane, 50% of the landfill gas total)

The following equation from AP-42, Fifth Edition Section 2.4.4.1 "Emissions", Revised November 1998, is used to calculate the individual air pollutant flow rate (m^3/hour) as part of the methane generation from the landfill.

$$Q_p = 2.0 \times Q_{CH_4} \left(\frac{C_p}{1 \times 10^6} \right)$$

Where: Q_p = Emission rate of pollutants, m^3/hour
Q_{CH4} = 15,472.5 scf/hr (methane is only 50% of the maximum LFG flow into the engine)
C_p = default concentration of total reduced sulfur (TRS) in landfill gas, Section 2.4.4.2
Multiplication factor = 2.0 assumes 50% landfill gas is methane

$$Q_p = 2.0 \times \frac{15{,}472.5\, ft^3\ CH_4}{hour} \times \left(\frac{46.9\ parts}{1 \times 10^6} \right) \times \frac{1\, m^3}{35.315\ ft^3} = \frac{0.041\, m^3\ SO_2}{hour}$$

The following equation from AP-42, fifth edition, Section 2.4.4.1 "Emissions", Revised November 1998, is used to calculate the uncontrolled emission rate of individual air pollutants present in landfill gas.

$$UM_p = Q_p \left[\frac{MWs \times 1\ atmosphere}{(8.205 \times 10^{-5}\ m^3 - atmospere / gmol - {}^0K) \times (1000\ g / kg)(273 + T)\ {}^0K} \right]$$

Where: UM_p = Uncontrolled mass emissions of pollutants, kg/hr
MW_p = Molecular weight of pollutant, g/mol (SO_2 = 64.06 g/gmole)
Q_p = Emission rate of pollutant, m^3/hour (0.041 m^3/hr)
T^0 = Default AP-42 temperature of the landfill gas (25 degrees C)

$$UM_p = \frac{0.041\, m^3 SO_2}{hour} \times \left[\frac{64.06\ g / gmole \times 1\ atmosphere}{\left(\frac{8.205 \times 10^{-5}\ m^3 - atmospere}{gmol - {}^0K} \right) \times \frac{1000\ g}{kg} \times (273 + 25^0 C)\ {}^0K} \right] = \frac{0.108\, kg\ SO_2}{hour}$$

$$Q_{sulfur\ dioxide} = \frac{0.108\ \text{kg}\ SO_2}{hour} \times \left(\frac{2.2\ lbs}{kg} \right) = \frac{0.24\ SO_2\ lbs}{hour}\ per\ engine$$

Potential emissions of sulfur dioxide have been calculated to be 0.24 lbs per hour. This value is much lower than the allowable sulfur dioxide emission rate or 13.1 lbs per hour. Compliance is indicated.

15A NCAC 2D .0521 "Control of Visible Emissions"
This regulation limits visible emissions from all sources to less than 20% opacity averaged over a 6-minute period with the exceptions noted in the regulation. Compliance is expected with this regulation when firing landfill gas under normal conditions.

15A NCAC 2D .0530 "Prevention of Significant Deterioration"
This regulation is applicable to the new equipment and the details of the regulation are provided in Section IV of this report.

15A NCAC 2D .0524, 40 CFR Part 60, Subpart JJJJ "Standards of Performance for Stationary Spark Ignition Internal Combustion Engines"

The genset engines are subject to New Source Performance Standards for spark ignition engines. This regulation applies to all owners and operators of stationary spark ignition internal combustion engines that commenced construction after June 12, 2006. The applicant can meet the requirements of this regulation by purchasing a manufacture certified engine that has been tested by the manufacturer to meet the following emission standards in accordance with 40 CFR §60.4243(b)(1).

After 7/1/2007	After 7/1/2010
• NOx emissions not to exceed 3.0 g/hp-hr	• NOx emissions not to exceed 2.0 g/hp-hr
• CO emissions not to exceed 5.0 g/hp-hr	• CO emissions not to exceed 5.0 g/hp-hr
• VOC emissions not to exceed 1.0 g/hp-hr	• VOC emissions not to exceed 1.0 g/hp-hr

15A NCAC 2D .1111 "Maximum Achievable Control Technology", and 40 CFR Part 63, Subpart ZZZZ "National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines"

This facility is subject to the Reciprocating Internal Combustion Engine (RICE) NESHAP for engines. This regulation applies to all owners and operators of RICE located at major and area sources of hazardous air pollutant (HAPs) emissions. The engines at this facility will be classified as "new" sources, they are at an area source of HAPs and they will commence construction (onsite fabrication) after June 12, 2006. The applicant can meet the requirements of this regulation by purchasing a manufacturer certified engine and by meeting the requirements of 40 CFR Part 60, Subpart JJJJ in accordance with 40 CFR §63.6590(c). Record shall be kept of their daily fuel usage monitors in accordance with 40 CFR §63.6655(c).

15A NCAC 2D .0524, 40 CFR Part 60, Subpart CCCC "Standards of Performance for Commercial and Industrial Solid Waste Incineration Units (CISWI)"

This regulation does not apply to the 3 utility flares (CD-1, CD-2, or CD-3) that will be used as control devices at the landfill in accordance with the landfill NSPS (Subpart WWW) because a CISWI unit does not include air pollution control equipment or the stack. (Ref: 40 CFR §60.2265 "Definitions").

This regulation does not apply to the 8 generator units (gensets) because a CISWI unit does not include any of the fifteen types of units described in §60.2555 of this subpart, nor does it include any combustion turbine or reciprocating internal combustion engine per 40 CFR §60.2265 "Definitions".

IV. Prevention of Significant Deterioration

The current landfill gas flow rate at this facility is 4,400 acfm. The collected landfill gas is ducted to an existing 141.3 million Btu per hour candlestick-type open flare (CD-1). This flare is capable of combusting approximately 4,700 acfm of landfill gas with a heating value of 500 Btu/scf. It has an inlet diameter of 16 inches and an inlet velocity of 56 fps at the maximum landfill gas flow rate. The exit height of the flare is 45 feet above the grade. The exhaust temperature at the flare exit is 1400 –1800 degrees F. Based on the manufacturer's specified good combustion, potential emissions from the existing flare for CO = 0.37 lbs/mmBtu heat input and NOx = 0.068 lbs/mmBtu heat input. The worse case pollutant emission rate from the existing facility is CO.

$$\frac{141.0\ mmBtu}{hour} \times \frac{0.37\ lbs\ CO}{mmBtu} \times \frac{8760\ hours}{year} \times \frac{1\ ton\ CO}{2000\ lbs\ CO} = \frac{229\ tons\ CO}{year}$$

The existing facility is classified as small for PSD purposes. However, with the requested changes at this facility, the proposed modification to install the eight genset units and the two additional flares have the potential to emit CO in excess of the PSD major source threshold of 250 tons per year. Because the modification by it self is greater than 250 tons per year, the source is considered major for PSD and the other criteria pollutants are compared to the major source significance levels (See Table 1 of this section).

The PSD estimates were based on the expected worst-case operation scenario {i.e. simultaneous operation of all eight genset engines at maximum flow}. The control devices (flares) are not included in this estimate.

CO emissions from the eight gensets = 2.75 g CO/Hp-hr
NOx emissions from the eight gensets = 0.50 g NOx/Hp-hr
PM10 emissions from the eight gensets = 0.15 g PM10/Hp-hr

$$\frac{2.75\ g\ CO}{Hp-hour} \times \frac{2233\ Hp}{unit} \times \frac{8.0\ units}{1} \times \frac{8760\ hours}{year} \times \frac{1\ lb\ CO}{453.59\ g\ CO} \times \frac{1\ ton}{2000\ lbs} = \frac{474.4\ tons\ CO}{year}$$

$$\frac{0.5\ g\ NOx}{Hp-hour} \times \frac{2233\ Hp}{unit} \times \frac{8.0\ units}{1} \times \frac{8760\ hours}{year} \times \frac{1\ lb\ NOx}{453.59\ g\ NOx} \times \frac{1\ ton}{2000\ lbs} = \frac{86.25\ tons\ NOx}{year}$$

$$\frac{0.15\ g\ PM10}{Hp-hour} \times \frac{2233\ Hp}{unit} \times \frac{8.0\ units}{1} \times \frac{8760\ hours}{year} \times \frac{1\ lb\ PM10}{453.59\ g\ PM10} \times \frac{1\ ton}{2000\ lbs} = \frac{26.0\ tons\ PM10}{year}$$

While the proposed PSD project sources (8-genset units) will have emissions of the pollutants listed above, the VOC potential emission rates will increase by a small percentage. The flare (maximum flow rate 4700 cfm, 282000 cf/hr) currently destroys NMOC (halogenated) at 98% removal efficiency (AP-42, 11/98). The landfill gas currently generated by the landfill will be rerouted to the genset units that will destroy the NMOC (halogenated) emissions at a rate of 93% (AP-42, 11/98). VOC emissions are approximately 99.7% of NMOC emissions, having a default concentration of 835 ppmv in landfill gas. The molecular weight of 86.18 for hexane will be used to express the VOC emissions.

The following equation from AP-42, Fifth Edition Section 2.4.4.1 "Emissions", Revised November 1998, is used to calculate the individual air pollutant flow rate (m^3/hour) as part of the methane generation from the landfill, and the increase in emissions from burning the landfill gas entirely in the existing flare and rerouting the landfill gas to the 8 new genset units.

$$Q_p = 2.0 \times Q_{CH_4} \left(\frac{C_p}{1 \times 10^6} \right)$$

Where:
Q_p = Emission rate of pollutants, m^3/hour
Q_{lfg} = 30,945 cf/hr into each genset unit (247,560 cfh total for eight units)
Q_{CH4} = 15,472.5 cf/hr (methane is only 50% of the maximum LFG flow into the engine)
C_p = default concentration of VOCs (835 ppmv) expressed as hexane, Section 2.4.4
Multiplication factor = 2.0 assumes 50% landfill gas is methane

$$Q_p = 2.0 \times \frac{15{,}472.5\ ft^3\ CH_4}{hour} \times \left(\frac{835\ parts}{1 \times 10^6} \right) \times \frac{1\ m^3}{35.315\ ft^3} = \frac{0.732\ m^3\ VOC}{hour}$$

The following equation from AP-42, fifth edition, Section 2.4.4.1 "Emissions", Revised November 1998, is used to calculate the uncontrolled emission rate of individual air pollutants present in landfill gas.

$$UM_p = Q_p \left[\frac{MWs \times 1\ atmosphere}{(8.205 \times 10^{-5}\ m^3 - atmospere/gmol - {}^0K) \times (1000\ g/kg)(273 + T)\ {}^0K} \right]$$

Where:
UM_p = Uncontrolled mass emissions of pollutants, kg/hr
MW_p = Molecular weight of pollutant, g/mol (SO_2 = 64.06 g/gmole)
Q_p = Emission rate of pollutant, m^3/hour (0.041 m^3/hr)
T^0 = Default AP-42 temperature of the landfill gas (25 degrees C)

$$UM_p = \frac{0.732\ m^3\ VOC}{hour} \times \left[\frac{86.18\ g/gmole \times 1\ atmosphere}{\left(\frac{8.205 \times 10^{-5}\ m^3 - atmospere}{gmol - {}^0K}\right) \times \frac{1000\ g}{kg} \times (273 + 25^0 C)\ {}^0K} \right] = \frac{2.58\ kg\ VOC}{hour}$$

$$VOC_{\frac{emissions}{genset\ units}} = \frac{2.58\ \text{kg}\ VOCs}{hour} \times \left(\frac{2.2\ lbs}{kg}\right) \times \frac{8\ units}{1} \times (1 - 0.93) = \frac{3.18\ lbs\ VOCs}{hour}\ (controlled\ from\ 8\ engines)$$

The same equations were used to calculate the VOC emissions that would escape the flare at a control efficiency of 98% except the landfill gas flow rate into the flare is 4700 scfm (282,000 cf/hour).

$$VOC_{\frac{emissions}{flare}} = \frac{23.51\ \text{kg}\ VOCs}{hour} \times \left(\frac{2.2\ lbs}{kg}\right) \times (1 - 0.98) = \frac{1.03\ lbs\ VOCs}{hour}\ (controlled\ from\ flare)$$

The increase in VOC emission under the current scenario would be 2.15 lbs VOC/hour (9.42 tons/year). When the landfill is at maximum production in the future, the existing large flare would be in operation and the landfill would support the continuous operation of the 8 genset units. Under this scenario, the increase would be 14 tons VOCs/year.

$$VOC_{\frac{emissions}{gnest\ units}} = \frac{3.18\ lbs\ VOCs}{hour} \times \frac{8760\ hour}{year} = \frac{14.0\ tons\ VOCs}{year}\ (for\ 8\ genset\ units)$$

This PSD project will include the installation of a gas treatment system that will be located between the collection system and just prior to the engines to meet compliance with NSPS Subpart WWW §60.752 (a)(b)(iii)(C) for the landfill. This means that the genset units will not be required to be evaluated as control devices to show compliance with NMOC destruction in the landfill gas even though they will perform the function of a control device.

Table 1: Potential Project Emissions

PSD Pollutant	PSD Significance Level	Project Emissions	Modeling Required?
Carbon Monoxide	250 tons/yr	474.36 tons/yr	**Yes**
Nitrogen Oxides	40 tons/yr	86.25 tons/yr	**Yes**
Particulate Matter	25 tons/yr	26.02 tons/yr	---
Particulate Matter (PM10)	15 tons/yr	26.02 tons/yr	**Yes**
Particulate Matter (PM2.5)	10 tons/yr	26.02 tons/yr	**Yes**
Sulfur Dioxide	40 tons/yr	7.84 tons/yr	No
VOC	40 tons/yr	14 tons/year	No
Lead	0.6 tons/yr	---	---
Fluorides	3.0 tons/yr	---	---
Sulfuric Acid Mist	7.0 tons/yr	---	---
Hydrogen Sulfide	10.0 tons/yr	0.47 tons/yr	No
TRS	10.0 tons/yr	0.55 tons/yr	No

Note: The projected potential emissions listed in Table 1, Section III, page 10 of the application is for the projected increase in VOC emissions without taking into account the emissions already emitted from the current flare (control device). If this value is subtracted from the projected emissions, the applicant calculates that the increase in emissions would be less than 20 tons VOCs per year.

The nearest Class I area is the Swan Quarter National Wildlife Refuge, which is located approximately 195 kilometers north east of the Sampson County Disposal landfill. The Federal Land Manager (FLM) was contacted on March 17, 2009 by the Air Quality Analysis group to notify the FLM of this proposed project. The Federal Land Manager responded on March 19, 2009 stating that a Class I Increment/Air Quality Related Values analysis was not required. However, a copy of the application, along with a letter describing the project, was sent by Booker T. Pullen to the FLM on June 2, 2009.

Under the PSD requirements, all new or modified major stationary sources of air pollutants regulated under the Clean Air Act (CAA) must undergo a preconstruction review consistent with Section 165 of the Act prior to beginning actual construction. A "major stationary source" is defined as any one of 28 named source categories that have the potential to emit 100 tons per year (tpy) or more, or any other stationary source that has the potential to emit 250 tpy or more, of any pollutant regulated under the CAA. Sampson County Disposal Landfill is not one of the listed source categories with a 100 ton per year threshold. Therefore the major source threshold for the proposed facility is 250 tpy of any regulated pollutant. *See 40 CFR 51.166 (b)(23).*

Sampson County Disposal, prior to the operation of this proposed modification, had a potential to emit of a less than 250 tpy of any of the criteria pollutants and the facility was classified as a PSD minor stationary source. However, the proposed modification by itself will increase the emissions of carbon monoxide to levels greater than 250 tons per year. The modification triggers a PSD review. This area is classified as attainment with respect to the National Ambient Air Quality Standards (NAAQS) for particulate, sulfur dioxide, ozone, nitrogen dioxide, carbon monoxide and lead. Because the area is classified as attainment for all pollutants, no pollutants are subject to nonattainment review.

Because the facility is major with this modification, each pollutant with a "potential to emit" greater than the "significance" levels is subject to PSD regulations and must meet certain review requirements. As noted above, CO, NOx, and PM10 exceed the PSD significance level and are therefore subject to PSD. Sampson County Landfill submitted the following reviews and analyses required for PSD review for each subject pollutant:

1) A Best Available Control Technology (BACT) Determination as determined by the permitting agency on a case-by-case basis in accordance with 40 CFR 51.166(j),
2) An Air Quality Impacts Analysis for NOx was included as part of the application.
3) An Additional Impacts Analysis including effects on soils and vegetation, and impacts on visibility[1] in accordance with 40 CFR 51.166(o).

Class I impact analysis was not included because the Federal Land Manager for the closest Class I area was contacted on March 17, 2009 and they responded on March 19, 2009 stating that a Class I Increment/Air Quality Related Values was not required.

Under PSD regulations, the basic control technology requirement is the evaluation and application of BACT. BACT is defined as follows [40 CFR 51.155 (b)(12)]:

> *An emissions limitation...based on the maximum degree of reduction for each pollutant... which would be emitted from any proposed major stationary source or major modification which the reviewing authority, on a case-by-case basis, taking into account energy, environment, and economic impacts and other costs, determines is achievable... for control of such a pollutant.*

As evidenced by the statutory definition of BACT, this technology determination must include a consideration of numerous factors. The structural and procedural framework upon which a decision should be made is not prescribed by Congress under the Act. This void in procedure has been filled by what several guidance documents issued by the federal EPA. The only final guidance available is the October 1980 "Prevention of Significant Deterioration – Workshop Manual." As the EPA states on page II-B-1, "A BACT determination is dependent on the specific nature of the factors for that particular case. The depth of a BACT analysis should be based on the quantity and type of pollutants emitted and the degree of expected air quality impacts." (emphasis added).

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[1]The visibility impacts to be evaluated under this subparagraph of the PSD rules is distinct from the Class I AQRV analysis.

The EPA has issued additional DRAFT guidance suggesting the use of what they refer to as a "top-down" BACT determination method. While the EPA Environmental Appeals Board recognizes the "top-down" approach for delegated state agencies,[2] this procedure has never undergone rulemaking and as such, the "top-down" process is not binding on fully approved states, including North Carolina.[3] The Division prefers to follow closely the statutory language when making a BACT determination and therefore bases the determination on an evaluation of the statutory factors contained in the definition of BACT in the Clean Air Act. As stated in the legislative history and in EPA's final October 1980 PSD Workshop Manual, each case is different and the state must decide how to weigh each of the various BACT factors. North Carolina is concerned that the application of EPA's DRAFT suggested "top-down" process will result in decisions that are inconsistent with the Congressionally intent of PSD and BACT. The following are passages from the legislative history of the Clean Air Act and provide valuable insight for state agencies when making BACT decisions.

The decision regarding the actual implementation of best available technology is a key one, and the committee places this responsibility with the State, to be determined on a case-by-case judgment. It is recognized that the phrase has broad flexibility in how it should and can be interpreted, depending on the site.

In making this key decision on the technology to be used, the State is to take into account energy, environmental, and economic impacts and other costs of the application of best available control technology. The weight to be assigned to such factors is to be determined by the State. Such a flexible approach allows the adoption of improvements in technology to become widespread far more rapidly than would occur with a uniform Federal standard. The only Federal guidelines are the EPA new source performance and hazardous emissions standards, which represent a floor for the State's decision.

This directive enables the State to consider the size of the plant, the increment of air quality which will be absorbed by any particular major emitting facility, and such other considerations as anticipated and desired economic growth for the area. This allows the States and local communities judge how much of the defined increment of significant deterioration will be devoted to any major emitting facility. If, under the design which a major facility proposes, the percentage of increment would effectively prevent growth after the proposed major facility was completed, the State or local community could refuse to permit construction, or limit its size. This is strictly a State and local decision; this legislation provides the parameters for that decision.

One of the cornerstones of a policy to keep clean areas clean is to require that new sources use the best available technology available to clean up pollution. One objection which has been raised to requiring the use of the best available pollution control technology is that a technology demonstrated to be applicable in one area of the country in not applicable at a new facility in another area because of the differences in feedstock material, plant configuration, or other reasons. For this and other reasons the Committee voted to permit emission limits based on the best available technology on a case-by-case judgement at the State level. [emphasis added]. This flexibility should allow for such differences to be accommodated and still maximize the use of improved technology.

Legislative History of the Clean Air Act Amendments of 1977 (p. ____).

A. 15A NCAC 2D .0530 "Prevention of Significant Deterioration (PSD)"

To comply with the best available control technology (BACT) determination pursuant to 15A NCAC 2D .0530, "Prevention of Significant Deterioration", criteria pollutant emissions shall be controlled from the eight genset units (ID Nos. ES-Gen-1 through Gen-8) such that emissions shall not exceed:

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[2] See, http://es.epa.gov/oeca/enforcement/envappeal.html for various PSD appeals board decisions including standard for review.

[3] North Carolina has full authority to implement the PSD program, 40 CFR Sec. 52.1770

1. **Best Available Control Technology (BACT)**
   a. BACT for carbon monoxide (CO) from each genset unit = good combustion practices and 2.75 g/hp-hour.
   b. BACT for nitrogen oxides (NOx) from each genset unit = good combustion practices and 0.50 g/hp-hour.
   c. BACT for PM10 from each genset unit = good combustion practices and 0.15 g/hp-hour.
   d. BACT for PM2.5 from each genset unit = good combustion practices and 0.15 g/hp-hour.

Testing

2. The Permittee shall perform testing in accordance with 15A NCAC 2D .2600 and follow the procedures outlined below:
   a. The Permittee shall submit a completed Protocol Submittal Form to the DAQ Regional Supervisor at least 45 days prio to the scheduled test date. A copy of the Protocol Submittal Form may be obtained from the Regional Supervisor.
   b. The Permittee shall notify the Regional Supervisor of the specific test dates at least 15 days prior to testing in order to afford the DAQ the opportunity to have an observer on-site during the sampling program.
   c. During all sampling periods, the Permittee shall operate the emission source(s) under maximum normal operating conditions or alternative operating conditions as deemed appropriate by the Regional Supervisor or his delegate.
   d. The Permittee shall submit two copies of the test report to the DAQ. The test report shall contain at a minimum the following information:
      (A) a description of the training and air testing experience of the person directing the test;
      (B) a certification of the test results by sampling team leader and facility representative;
      (C) a summary of emissions results and text detailing the objectives of the testing program, the applicable state and federal regulations, and conclusions about the testing and compliance status of the emission source(s);
      (D) a detailed description of the tested emission source(s) and sampling location(s) process flow diagrams, engineering drawings, and sampling location schematics should be included as necessary;
      (E) all field, analytical, and calibration data necessary to verify that the testing was performed as specified in the applicable test methods;
      (F) example calculations for at least one test run using equations in the applicable test methods and all test results including intermediate parameter calculations; and
      (G) documentation of facility operating conditions during all testing periods and an explanation relating these operating conditions to maximum normal operation. If necessary, provide historical process data to verify maximum normal operation.
   e. The testing requirement(s) shall be considered satisfied only upon written approval of the test results by the DAQ.
   f. The DAQ will review emission test results with respect exclusively to the specified testing objectives as proposed by the Permittee and approved by the DAQ.

3. **PSD Performance Testing** - As required by 15A NCAC 2D .0530, the following performance tests shall be conducted. Compliance with this emission limit will be determined by an initial performance test within 60 to 180 days after normal operation testing for the "lbs per hour" of each pollutant as a surrogate for the g/hp-hour BACT limit for each pollutant.

Affected Sources	Pollutant	Test Method
ES-Gen-01	Carbon Monoxide (CO) = 13.54 lbs/hour Nitrogen Oxide (NOx) = 2.46 lbs/hour PM_{10} = 0.74 lbs/hour $PM_{2.5}$ = 0.74 lbs/hour	As determined by DAQ approved testing protocol
ES-Gen-02		
ES-Gen-03		
ES-Gen-04		
ES-Gen-05		
ES-Gen-06		
ES-Gen-07		
ES-Gen-08		

   a. The performance test shall be conducted using the test method specified in the table above in accordance with EPA Reference Methods, contained in 40 CFR Part 60, Appendix A. Use of an alternate test method must be approved in advance by the Division of Air Quality, and must be based on a test protocol that documents the alternate method is at least as accurate as the specified method. The EPA Administrator retains the exclusive right to approve equivalent and alternative test methods, continuous monitoring procedures, and reporting requirements.

b. Within 60 days after achieving the maximum production rate at which the genset units will be operated, but not later than 180 days after the initial start-up of the units, the Permittee shall conduct the required performance testing on the landfill gas-fired genset units and shall begin the required monitoring.
c. The number of runs and time required for each run for the performance test shall be in accordance with the approved testing protocol. The ambient temperature for each test run shall be above 0 degree F.
d. All associated testing costs are the responsibility of the Permittee.
e. At least 45 days prior to performing any required emissions testing, the Permittee must submit two copies of a testing protocol to the DAQ Regional Supervisor, for review and approval. All testing protocols must be approved by the DAQ prior to performing tests.
f. To afford the DAQ Regional Supervisor the opportunity to have an observer present, the Permittee shall provide the Regional Office, in Writing, at least 15 days notice of any required performance test(s).
g. The Permittee shall submit two copies of a written report of the results of each performance test, postmarked no later than 60 days following the completion of the test, to the Regional Supervisor, DAQ.
h. The Division of Air Quality retains the right to require additional performance testing for the genset units if the results of the stack tests show a small margin of compliance with a $PM_{10}/PM_{2.5}$, CO, or NOx emission limit.

4. **PSD Monitoring:**
If the Permittee adjusts engine settings according to and consistent with the manufacturer's instructions, the stationary SI internal combustion engine will not be considered out of compliance. If the Permittee operates and maintains the certified landfill gas-fired stationary spark ignition internal combustion engine according to the manufacturer's emission-related written instructions, they shall keep records of conducted maintenance to demonstrate compliance.

5. **Recordkeeping/Reporting** [15A NCAC 2Q .0508(f)]
Owners and operators of all stationary spark ignition internal combustion engines shall keep records of:
a. All notifications submitted to comply with this regulation and all documentation supporting any notifications.
b. Maintenance conducted on the engine.
c. Documentation from the manufacturer that the engine is certified to meet the emission standards and information as required in 40 CFR Parts 90, 1048, 1054, and 1060, as applicable.

V. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

The newly proposed genset units are subject to BACT review. As discussed earlier the applicant estimated the uncontrolled emissions of NOx (86.25 tpy), carbon monoxide (474.36 tpy) and PM10 (26.02 tpy). (See the application for details of emission estimates). The applicant evaluated the following control technologies and work practices for these landfill gas-fired engines (Catepillar, Model # G3520C). *The catalog information supplied with the application for another landfill site using identical engines, contains the following definition for "nominal value" for these engines in the Definitions and Conditions Section. "Nominal value = emissions from a new engine during the first 100 hours of operation."*

A. ----------CARBON MONOXIDE (CO) BACT ANALYSIS----------

1.0 Sources of Carbon Monoxide (CO) Emissions

The sources of CO emissions associated with this project are the eight genset units.

1.1 CO Formation Processes

CO emissions from the genset units occur from the incomplete combustion of CO, methane, and other organic compounds in the landfill gas that is burned. The primary operation scenario for this project will be the burning of landfill gas in the eight genset units. The gensets (4 stroke, lean burn units) are designed and certified by the manufacturer to comply with the spark ignition New Source Performance Standard emission limits for NOx, CO, and VOCs. Each of the genset units is equipped with an electronic engine control module that adjusts the ignition timing and air/fuel ratio with any variations in landfill gas composition to meet the applicable spark ignition emission limits.

A. ----------CARBON MONOXIDE (CO) BACT ANALYSIS----------

1.2 **CO from eight genset units**

Combustion adjustments to reduce NOx emissions may result in increased CO emission rates. Likewise combustion adjustments to reduce CO emissions may result in increased NOx emission rates. The electronic engine control module on the installed gensets will automatically adjust the ignition timing and air/fuel ratio to insure simultaneous compliance with the NOx, CO, and VOC, emissions limits specified in the spark ignition NSPS. The applicable CO limit for spark ignition engines greater than 500 Hp under the spark ignition NSPS for new engines manufactured after July 1, 2007 is 5.0 g/hp-hr. The manufacturer specified nominal CO emission rate for the Caterpillar G3520C engine with the electronic engine control module is 2.5 g/hp-hr for the first 100 hours of operation. The long-term achievable CO emission rate is projected at 2.75 g/hp-hr. At this emission factor, each 2233 Hp engine has a potential CO emission rate of 13.54 lbs CO per hour.

2.0 -- Identification of CO Control Options

This section reviews the available CO control technologies that were considered for the Sampson County Disposal Landfill Facility.

2.1 **Good Combustion Control**

On January 18, 2008, the US EPA promulgated the Standards of Performance for Stationary Spark Ignition IC engines (SI NSPS) in 40 CFR Part 60, Subpart JJJJ. These regulations established manufacturer design model-year engine specific CO, NOx, and VOC emissions limits for different engine sizes firing different fuels. The established limits are based on good combustion control engine design. Subpart JJJJ limits are applicable to the proposed gensets in this application. The SI NSPS Limit for CO applicable to the proposed gensets is 5.0 g/hp-hr. However, the specified PSD BACT/LAER emission limits from recently installed internal combustion engines at landfill gas to energy projects ranges from 2.5g/hp-hr and 3.0 g/hp-hr. Based on a review of the available BACT determinations, it is believed that the lower PSD BACT limits in the 2.5 g/hp-hr range are based on initial engine performance and do not represent achievable emission rates over the entire engine life. The somewhat higher PSD BACT limit in the 2.75 g/hp-hr to 3.0 g/hp-hr range appears to consider increasing emission rates with degrading engine performance over time, due to the presence of silicon based gases called siloxane and other abrasive materials in the landfill gas. This consideration is supported by fact that the manufacturer specified a 2.5 g/hp-hr nominal CO emission rate for the proposed engine is for the first 100 hours of operation of a new engine.

2.2 **Catalytic Oxidation**

On June 15, 2004, the US EPA promulgated the National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE MACT) in 40 CFR Part 63, Subpart ZZZZ. The RICE MACT as originally promulgated was applicable to engines greater than 500 Hp located at a major source of hazardous air pollutant (HAP) emissions. The regulation was revised on January 18, 2008 to expand the applicability requirements for all stationary reciprocating engines at area sources as well as major HAP sources. The control technology base for the RICE MACT standards for engines greater than 500 Hp at major HAP sources is an oxidation catalyst. The catalyst that is in these devices lowers the required combustion temperatures for affected pollutants and allows oxidation of the pollutants at the engine and/or flare exhaust temperatures. Although CO is not a hazardous air pollutant (HAP), the RICE MACT establishes minimum control requirements for CO as a surrogate indicator for control of organic HAPs. The established CO reduction requirements vary with the engine type (spark engine vs. compression engine). Compression ignition engines are required to reduce CO by 70% with an oxidation catalyst, while 4-stroke lean burn spark ignition engines (4SLB) are generally required to reduce CO by 93% with an oxidation catalyst.

A. ----------CARBON MONOXIDE (CO) BACT ANALYSIS----------

3.0 -- Elimination of Technically Infeasible CO Control Options

The next step in the BACT analysis for CO is to eliminate any technically infeasible or undemonstrated control technologies. Each control technology is considered and those that are infeasible based on physical, chemical, and engineering principles or are undemonstrated in the Gas-to-Energy type industries were eliminated.

3.1 Good Combustion Practices

This is a technically feasible option and will be further considered in the BACT analysis.

3.2 Catalytic Oxidation

The RICE MACT and the spark ignition NSPS state that landfill gas contains a family of silicon-based gases collectively called siloxanes. Combustion of siloxanes form compounds that have been known to foul fuel systems, combustion chambers, and post-combustion catalyst, rendering them inoperable in a short period of time.

As documented by the US EPA, oxidation catalysts have been determined to be technically infeasible control options for landfill gas-fired engines. No catalytic oxidation units are currently being used on any Gas-to-Energy facilities in the U.S. or abroad.

4.0 Ranking of Technically Feasible CO Control Options

4.1 Evaluation of Technically Feasible CO Control Options

The third step in the BACT analysis for CO is to complete the analysis of the feasible control technologies and document the results. The feasible control technologies are evaluated on the basis of economic, environmental, and energy considerations.

The only control technology option that is considered technically feasible for this project for the control of CO emissions is good combustion control practices in accordance with the spark ignition New Source Performance Standard, Subpart JJJJ. Burning landfill gas produces other pollutants such as PM10, nitrogen oxide emissions, and some trace amounts of toxic air pollutants. However, the amounts of these emissions can vary widely, depending on the waste from which the landfill gas was created. Producing electricity from landfill gas avoids the need to use non-renewable resources to produce the equivalent amount of electricity. Also, burning landfill gas prevents the release of methane, a potent greenhouse gas.

5.0 -- Evaluation of Technically Feasible CO Control Options

The fourth step in the BACT analysis for CO emissions from this project is to complete the analysis of the applicable control technologies and to document the results. The feasible control technologies are evaluated on the basis of economic, energy, and environmental considerations. Sampson County Disposal Landfill is proposing to control the CO emissions from this project by the use of good combustion control practices in accordance with the spark ignition New Source Performance Standard, Subpart JJJJ. No other technologies appear to be technically feasible for this project.

6.0 -- RBLC Database Search

RBLC Database Search Results Summary for carbon monoxide (CO) are included in the following table. A BACT analysis review on the EPA website was conducted for CO at gas-to-energy facilities. This section reviews the available CO control technologies that apply to the proposed project. In preparing this section, a review of EPA's emission standard determination methods for the reciprocating internal combustion engines was made. EPA evaluated several types of control methods in developing the NSPS and NESHAP for this type of combustion devices. In establishing and promulgating the NSPS and NESHAP emission limits, EPA focused mainly on good combustion practices and oxidation catalysts.

The RBLC database was queried for emission sources and control devices of CO for reciprocating engines. Specifically the following parameters were entered into the search page:

- Search Database - RBLC Basic Search
- Permit dates: 01/01/99 – 10/02/2009
- Processes code: 17.100 "Large (>500 Hp) Combustion Engines
- Process name: Combustion Engine
- Pollutant Name: Carbon monoxide (CO)
- Corporate/Company or Facility Name Contains: Blank
- Facility State: All States
- Report: Comprehensive Report (As sorted in results table)

RBLC Database Search Results Summary For PSD Projects (landfill gas-fired generators & landfill gas-fired flares) – CO

RBLC ID	Company	Source Process description	Technology Applied	Limit
AZ-0042	Northwest Regional Landfill Maricopa County, Arizona	One IC engines (landfill gas-fired, 1410.0 Hp)	None	2.5 g/BHp-hr (7.77 lbs CO/hr)
CA-0122	Chino Basin Desalter Authority San Bernardio County, California	One IC engine (digester gas-fired, 10.75 mmBtu per hour) 1408 bhp	Turbocharged, inter-cooled, lean burn, air/fuel controller	2.5 g/BHp-hr 1 hour average (BACT) (7.76 lbs CO/hr)
CA-1092	MM San Bernardino Energy, LLC San Bernardio County, California	One IC engine (landfill gas-fired, 14.7 mmBtu per hour) 1850 bhp	Turbocharged, inter-cooled, air/fuel controller	2.5 g/BHp-hr (BACT) (10.19 lbs CO/hr)
FL-0289	Trail Ridge Energy, LLC Duval County, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	Good combustion practices	2.75 g/BHp-hr (BACT) (13.01 lbs/hr)
FL-0290	Seminole Energy, LLC Osceola Road Solid Waste Management Facility, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	Good combustion practices	2.75 g/BHp-hr (BACT) (BACT) (13.01 lbs/hr)
FL-291 (Draft)	Brevard Energy, LLC Brevard County, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	Good combustion practices	2.75 g/BHp-hr (BACT) (13.01 lbs/hr)
ME-0036	New England Waste Services of ME, Inc., Penobscot County, Maine	Three IC engines (landfill gas-fired, 10.8 mmBtu/hr) ≈1359 hp	None	2.75 g/BHp-hr (BACT) (8.24 lbs CO/hr)
MI-0371	Sumpter Energy Associates Wayne County, Michigan	Six IC engines (landfill gas-fired, 8.60 mmBtu per hour each)	Good combustion practices	7.28 lbs/hr 3-hour average (BACT)
NH-0014	University of New Hampshire Stafford County, New Hampshire	Two IC engines (landfill gas-fired, 1600 kW each) ≈2145 hp	Good combustion practices	2.75 g/BHp-hr 3-hour aver. Stk test (BACT) (13.01 lbs CO/hr)
NJ-0067	Burlington County Resource Recovery, Burlington County, New Jersey	Five IC engines (landfill gas-fired, 12.5 mmBtu/hr, 1500kW each) ≈2012 hp	None	2.5 g/BHp-hr (BACT) (11.1 lbs CO/hr)
NJ-0068	Manchester Renewable Power Corporation (LES), Ocean County, New Jersey	Six IC engines (16.38 mmBtu/hr, 2233 Hp, 1600 kW)	None	2.75 g/BHp-hr (BACT) (13.54 lbs CO/hr)
NJ-0069 (Draft)	Monmouth County Reclamation Center, Monmouth County, New Jersey	One IC engine (landfill gas-fired, lean burn, 9.81 mmBtu/hr, 1468 BHp, 1000 kW)	None	2.53 g/BHp-hr (8.19 lbs CO/hr)
OH-260	Bio-Energy, LLC, Mahoning County, Ohio	Sixteen IC engines (landfill gas-fired, 14.0 mmBtu/hr, 1877 BHp, 1400 kW each)	None	0.67 lbs/mmBtu, 9.4 lbs/hour (BACT)
RI-0022	Ridgewood Power Management, LLC, Providence County, Rhode Island	Four IC engine generator sets (landfill gas-fired, 2229.0 Hp each)	Good combustion practices	2.75 g/BHp-hr 1-hour aver. (BACT) (13.51 lbs CO/hr)
TX-0385	Reliant Energy Renewables Coastal Plains LP, Galveston County, Texas	Seven IC engines (landfill gas-fired, 2343 BHp each)	None	3.0 g/BHp-hr (BACT) 15.49 lbs CO/hr
TX-0404	Reliant Energy Renewables Security LP, Montgomery County, Texas	Four IC engines (landfill gas-fired, 1664.0 kW each) ≈2232 hp	Good combustion practices	3.0 g/BHp-hr (BACT) 14.76 lbs CO/hr
TX-0495	Bio Energy Texas, LLC	Eight IC engines (landfill gas-fired, 2172 BHp each)	Proper operation and maintenance	2.80 g/BHp-hr (BACT) 13.41 lbs CO/hr
VA-288	Industrial Power Generating Corp., INGENCO, Chesapeake County, Virginia	36 IC engines (six groups of six engines, 550 Hp each)	Fuel limit, landfill gas heat input ratio less than 50%	7.7 g/BHp-hr 9.34 lbs CO/hr
VT-0019	New England Waste Services, Inc., Orleans County, Vermont	Four IC engines (landfill gas-fired, 1600 kW, 2221 Hp each)	Low emission engine design	2.75 g/BHp-hr 1-hour average (BACT) 13.47 lbs CO/hr

7.0 -- Selection of BACT for CO

Sampson County Disposal Landfill proposes as BACT the use of good combustion practices for carbon monoxide emissions from the internal combustion engines. The BACT limit for each of the internal combustion engines is: CO = 2.75 g/hp-hour. This BACT limit is equal to or less than the limits listed in the RBLC database for engines of equal size ratings and reflects the degradation of new engines after 100 hours (less than 5 days) of operation. These engines are required to meet the BACT limit over the life of each engine. Compliance with this emission limit will be determined by an initial performance test within 60 to 180 days after normal operation testing for the lbs CO per hour as a surrogate for the g/hp-hour BACT limit.

B. ----------NITROGEN DIOXIDE (NOx) BACT ANALYSIS----------

The sources of NOx emissions associated with the proposed project are the eight genset units.

1.0 -- NOx Formation and Control Mechanisms

Potential NOx emissions from the eight new genset units result from the combustion of nitrogen containing compounds in the landfill gas and thermal fixation of atmospheric nitrogen in the combustion air. The genset units in this project are designed and certified by the manufacturer to comply with SI NSPS emission limits for NOx, CO, and VOCs. The electronic engine control module on the installed genset units will automatically adjust the ignition timing and air/fuel ratio to insure simultaneous compliance with the NOx, CO, and VOC emission limits specified in the SI NSPS.

The applicable NOx limit for spark ignition engines greater than 500 Hp under the SI NSPS for new landfill gas-fired engines manufactured after July 1, 2007 is 3.0 g/hp-hr. The manufacturer specified NOx emission rate for the Caterpillar G3520C engine with the electronic engine control module is 0.50 g/hp-hr. At the outlet 0.50 g/hp-hr emissions rate, each 2,233 Hp engine has a potential NOx emission rate of 2.46 lbs/hr and 10.78 tons/year at 8,760 hours per year of operation at 100% capacity.

2.0 -- Identification of NOx Control Options

2.1 The NOx control technologies identified for potential applicability to landfill gas-fired genset units are those technologies that are specified in the SI NSPS and recent PSD BACT determinations for post combustion add on technology. Post combustion NOx control technologies include catalyst-based systems and non catalyst-based systems.

2.2 Selective Catalytic Reduction (SCR), Regenerative Selective Catalytic Reduction (RSCR), Non Selective Catalytic Reduction (NSCR)

Selective catalytic reduction (SCR) and regenerative selective catalytic reduction (RSCR) are NOx control technologies currently applied to boiler exhausts. SCR is a post-combustion add-on control device that involves injection of ammonia into the flue gas over a catalyst bed. The ammonia reacts with NOx to produce nitrogen (N_2) and water (H_2O) at operating temperatures of 600°F to 700°F. RSCR is a relatively new technology developed by Babcock & Wilcox (B&W) that combines traditional SCR technology with regenerative thermal oxidation (RTO) technology. The technology was developed by B&W to reduce NOx control costs associated with traditional tail-end SCR applications on combustion units with low exhaust temperatures in the 300-400 °F range, such as solid waste-fired boilers. RSCR utilizes multiple regenerative catalyst bed cycling technology to recover potentially lost heat and reduce the corresponding reheat energy costs. Non-selective catalytic reduction uses a three-way catalyst to remove NOx and CO from IC engine exhausts. Each of these technologies relies on catalyst for NOx reduction. As discussed above, the presence of the silicon-based gases collectively called siloxanes and other chemical compounds in landfill gas, can foul or poison the catalyst, rendering them inoperable in a short period of time. EPA states this assessment in the preamble to the proposed 40 CFR 60, Subpart JJJJ Standards of Performance for Stationary Spark Ignition IC Engines (SI NSPS) and the proposed revisions to the RICE MACT dated June 12, 2006. As documented by EPA, any catalyst-based control systems have been determined to be technically infeasible control options for landfill gas-fired engines.

B. ----------NITROGEN DIOXIDE (NOx) BACT ANALYSIS (Cont.) ----------

2.3 Selective Non Catalytic Reduction (SNCR)

This control technology, also referred to as thermal DeNOx, is based on the reduction of NOx by the injection of ammonia or urea into the flue gas in a temperature window of 1,600°F to 2,000°F without any reaction catalyst. Ammonia or urea is injected at molar ratios of 1.15 to 3.0. In urea-based systems, the urea decomposes to produce ammonia for the reduction reaction. The excess ammonia provided at molar ratios exceeding 1.0 is referred to as "slip" and is emitted to the atmosphere. Ammonia slip from SNCR installations on boilers has typically been reported at levels of 10 ppm and can be as high as 40 ppm at the higher molar ratios. While ammonia is not a federally regulated HAP, it is a regulated North Carolina TAP. Under the TAP regulations, emissions of ammonia above 0.68 lb/hr are considered significant and must be modeled for resulting ambient concentrations prior to permitting. Potential ammonia slip is considered a significant concern with SNCR.

Review of EPA's RACT/BACT/LAER Clearinghouse (RBLC) and other data available in the literature does not indicate any SNCR installations on IC engine exhausts at LFG to energy projects. However, it is conceivable that an SNCR system could be installed on the exhaust systems for the eight gensets proposed in this application. It is assumed that the most economical approach would be to install one SNCR system on the combined exhausts of all eight gensets. While this technology has not been demonstrated, the potential cost effectiveness of an SNCR installation on the eight genset combined exhaust configuration have been assessed in this BACT analysis. The cost effectiveness calculations for the SNCR system are presented in Appendix E of the application. For this cost analysis, the EPA's Coal Utility Environmental Cost Model (CueCost) was used to estimate the total installed capital cost of a SNCR system on the combined exhaust of the eight gensets. The CueCost model was developed by EPA for large utility boilers and includes cost estimation procedures for SNCR systems on these boilers. The CueCost model was adjusted in this analysis for a smaller flue gas volume source using the procedures specified in "Applicability and Feasibility of NOx, SO_2, and PM Emissions Control Technologies for Industrial, Commercial, and Institutional (ICI) Boilers, November 2008" developed by the Northeast States Coordinated Air Use Management (NESCAUM). The capital cost estimates were based on a coal-fired boiler that would have a flue gas volume similar to the combined exhaust of the eight gensets proposed in this application. Based on the CueCost model, the projected total installed capital cost of a SNCR on the combined genset exhaust is $1,499,332 (2008). The $1,499,332 total installed capital costs for a SNCR was annualized at an equipment life of 15-years with an interest rate of 10% in this analysis.

While the CueCost model can provide annual operating cost estimates for SNCR systems on boilers, these costs were not judged to be directly applicable to a SNCR system on the combined exhaust from eight LFG-fired gensets. For this analysis, the annualized operating costs specific to SNCR were developed using the cost estimate procedures presented in EPA's Air Pollution Control Cost Manual (EPA-452-02-001). As discussed above, the operating temperature window for SNCR is 1,600°F to 2,000°F. Since the exhaust gas temperature of the gensets is only 896°F, utilization of SNCR would require reheat of the exhaust to at least 1,600°F. The reheat energy costs can be calculated based on the enthalpy and flow rate of the flue gas stream. The reheat energy costs depend on the inlet flue gas temperature to the SNCR and the SNCR exist gas temperature. The net difference in temperature along with the flue gas flow rate determines the required reheat energy. However, for this economic analysis, Sampson County Disposal has assumed no reheat costs in the cost analysis, since available landfill gas could be used for exhaust reheat.

As shown in Appendix E, the total annualized cost of a SNCR on the combined genset exhaust would be about $524,361 per year with no reheat costs. Since the literature does not indicate any SNCR installations on combined LFG-fired IC engine exhausts, there is no documentation for achievable NOx reductions on these sources. For this economic analysis, SCD has evaluated SNCR cost effectiveness at a potential 70% control efficiency. At a potential 70% control efficiency, potential NOx emissions (86.25 ton/yr) could be reduced by 60.37 tons/yr. A 60.37 ton/yr NOx reduction at an annualized cost of $524,361 per year equates to a cost effectiveness of $8,685/ton of NOx removed. This high cost effectiveness demonstrates that SNCR is not an economically viable control option on the eight genset exhausts, even if the costs and environmental impacts of exhaust gas reheat are ignored.

B. ----------NITROGEN DIOXIDE (NOx) BACT ANALYSIS (Cont.) ----------

2.4 Good Combustion Design For NOx Control

On January 18, 2008, EPA promulgated the Standards of Performance for Stationary Spark Ignition IC Engines (SI NSPS) at 40 CFR 60, Subpart JJJJ. These regulations established manufacturer design model year engine-specific CO, NOx, and VOC emission limits for different-sized engines firing different fuels. The established limits are based on good combustion control engine design. The Subpart JJJJ limits are applicable to the proposed gensets in this application. As noted earlier, the eight proposed units are Caterpillar G3520C engine gensets rated at 2,233 Hp (1,600 kW) each. The applicable NOx limit for LFG-fired spark ignition engines greater than 500 Hp manufactured after July 1, 2007 is 3.0 g/hp-hr. While the SI NSPS specifies a maximum 3.0 g/hp-hr, the manufacturer specified NOx emission rate for the Caterpillar G3520C engine with the electronic engine control module is 0.50 g/hp-hr. At the outlet 0.50 g/hp-hr emission rate, each 2,233 Hp engine has a potential NOx emission rate of 2.46 lb/hr.

3.0 -- Elimination of Technically Infeasible NOx Control Options

The second step in the BACT analysis for NOx is to eliminate any technically infeasible or undemonstrated control technologies. Each control technology was considered and those that were infeasible based on physical, chemical, and engineering principles or commercially unavailable were eliminated. Selective Non Catalytic Reduction and Good Combustion Design will be further evaluated. These are technically feasible options for NOx control.

4.0 -- Ranking of Technically Feasible NOx Control Options

4.1 Review of BACT/LAER Clearinghouse

A review of plants identified in the BACT/LAER Clearinghouse indicated that good combustion practices were selected as BACT for landfill gas-fired reciprocating internal combustion engines.

5.0 -- Evaluation of Technically Feasible NOx Control Options

The next step in a BACT analysis for NOx is to complete the analysis of the applicable control technologies and to document the results. The feasible control technologies are evaluated on the basis of economic, energy, and environmental considerations. Sampson County Disposal Landfill is proposing to employ good combustion practices for the genset units. The evaluation was limited to the incremental effectiveness of installing Selective Non catalytic reduction on a combined stack form the eight genset units.

Summary of Impact Analysis For NOx (eight genset units)

						Impacts		
Method	Removal	NOx removed (tons/yr)	Capital Costs $$	Annualized Costs $$/yr	Cost Effectiveness $/ton	Environ.	Product	Energy
SNCR **	70 %	60.37 tpy	$1,499,332	$524,361	$8,685/ton	Yes	No	No
Base *	0 %	----------	----------	----------	----------	----------	----------	----------

* BACT level of emissions

** Combined stack for the eight genset units

Baseline emissions for eight genset units = 86.24 tons per year

$$\text{Cost effectiveness} = \$/ton = \frac{\$524,361}{60.37\ ton} = \frac{\$8685.8}{ton\ NOx\ removed}$$

NSPS allowable NOx emission limit for each engine = 3.0 g/Hp-hr or

$$tpy = \frac{3.0\ grams}{horsepower - hr} \times \frac{2233\ horsepower}{1} \times \frac{1\ pound}{453.59\ grams} \times \frac{1\ ton}{2000\ lbs} \times \frac{8760\ hrs}{year} = \frac{64.69\ tons}{year}\ for\ each\ unit$$

Since the engine is capable of meeting the BACT limit, this amount is the base load before any other types of controls.

BACT limit = 0.5 g/Hp-hr

$$tpy = \frac{0.5\ grams}{horsepower - hr} \times \frac{2233\ horsepower}{1} \times \frac{1\ pound}{453.59\ grams} \times \frac{1\ ton}{2000\ lbs} \times \frac{8760\ hrs}{year} = \frac{10.78\ tons}{year}\ for\ each\ unit$$

(Base emissions = 10.78 tons NOx per year x 8 units = 86.24 tpy total)

B. ----------NITROGEN DIOXIDE (NOx) BACT ANALYSIS (Cont.) ----------

6.0 RBLC Database Search

RBLC Database Search Results Summary for nitrogen oxides (NOx) is included in the following table. A BACT analysis review on the EPA website was conducted for NOx at gas-to-energy facilities similar to the Sampson County Disposal project. This section reviews the available NOx control technologies that apply to the proposed project. In preparing this section, a review of EPA's emission standard determination methods for the reciprocating internal combustion engines was made. EPA evaluated several types of control methods in developing the NSPS and NESHAP for Gas-to-Energy facilities. In establishing and promulgating the NSPS and NESHAP emission limits, EPA focused mainly on good combustion practices and oxidation catalysts.

The RBLC database was queried for emission sources and control devices of CO for reciprocating engines. Specifically the following parameters were entered into the search page:

- Search Database - RBLC Basic Search
- Permit dates: 01/01/99 – 10/02/2009
- Processes code: 17.140 "Large (>500 Hp) Combustion Engines burning landfill gas/Digester gas/Bio-Gas
- Process name: Combustion Engine
- Pollutant Name: Nitrogen Dioxide (NOx)
- Corporate/Company or Facility Name Contains: Blank
- Facility State: All States
- Report: Comprehensive Report (As sorted in results table)

RBLC Database Search Results Summary For PSD Projects (landfill gas-fired generators) – NOx

RBLC ID	Company	Source Process description	Technology Applied	Limit
AZ-0042	Northwest Regional Landfill Maricopa County, Arizona	One IC engines (landfill gas-fired, 1410.0 Hp)	None	0.6 g/BHp-hr 1.87 lbs NOx/hr
CA-0122	Chino Basin Desalter Authority San Bernardio County, California	One IC engine (digester gas-fired, 10.75 mmBtu per hour) 1408 bhp	Turbocharged, inter-cooled, lean burn, air fuel controller	0.6 g/BHp-hr, 1 hour aver. (BACT) 1.86 lbs NOx/hr
CA-1092	MM San Bernardino Energy, LLC San Bernardio County, California	One IC engine (landfill gas-fired, 14.7 mmBtu per hour) 1850 bhp	Turbocharged, inter-cooled, air fuel controller	0.6 g/BHp-hr, (BACT) 2.45 lbs NOx/hr
FL-0289	Trail Ridge Energy, LLC Duval County, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	Good combustion practices	0.6 g/BHp-hr, (BACT) 2.84 lbs NOx/hr
FL-0290	Seminole Energy, LLC Osceola Road Solid Waste Management Facility, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	Good combustion practices	0.6 g/BHp-hr, (BACT) 2.84 lbs NOx/hr
FL-291	Brevard Energy, LLC Brevard County, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	Good combustion practices	0.6 g/BHp-hr, (BACT) 2.84 lbs NOx/hr
ME-0036	New England Waste Services of ME, Inc., Penobscot County, ME	Three IC engines (landfill gas-fired, 10.8 mmBtu/hr) ≈1359 hp	None	1.94 lbs/hr (BACT)
MI-0371	Sumpter Energy Associates Wayne County, Michigan	Six IC engines (landfill gas-fired, 8.60 mmBtu per hour each)	Good combustion practices	4.52 lbs/hour each (BACT)
NH-0014	University of New Hampshire Stafford County, New Hampshire	Two IC engines (landfill gas-fired, 1600 kW each) ≈2145 hp	Lean burn, air/fuel ratio controller, intercooler, good combustion pract.	0.50 g/BHp-hr (LAER) 1-hour avg. (stk test) 2.37 lbs NOx/hr
NJ-0067	Burlington County Resource Recovery, Burlington County, New Jersey	Five IC engines (landfill gas-fired, 12.5 mmBtu/hr, 1500kW each) ≈2012 hp	Good combustion practices	0.60 g/BHp-hr (LAER) 2.66 lbs NOx/hr

-Table continued on the next page-

RBLC Database Search Results Summary For PSD Projects (landfill gas-fired generators) – NOx

RBLC ID	Company	Source Process description	Technology Applied	Limit
NJ-0068	Manchester Renewable Power Corporation (LES), Ocean County, New Jersey	Six IC engines (16.38 mmBtu/hr, 2233 Hp, 1600 kW)	Air-to-fuel ratio control	0.50 g/BHp-hr (LAER) 2.46 lbs NOx/hr
NJ-0069 (Draft)	Monmouth County Reclamation Center, Monmouth County, New Jersey	One IC engine (landfill gas-fired, lean burn, 9.81 mmBtu/hr, 1468 BHp, 1000 kW)	None	0.53 g/BHp-hr (LAER) 1.72 lbs NOx/hr
OH-260	Bio-Energy, LLC, Mahoning County, Ohio	Sixteen IC engines (landfill gas-fired, 14.0 mmBtu/hr, 1877 BHp, 1400 kW each)	Lean burn technology	0.6 g/BHp-hr, (BACT) 2.48 lbs NOx/hr
RI-0022	Ridgewood Power Management, LLC, Providence County, Rhode Island	Four IC engine generator sets (landfill gas-fired, 2229.0 Hp each)	Lean burn, air/fuel ratio controllers, intercoolers	0.50 g/BHp-hr (LAER) 2.46 lbs NOx/hr
TX-0385	Reliant Energy Renewables Coastal Plains LP, Galveston County, Texas	Seven IC engines (landfill gas-fired, 2343 BHp each)	None	0.6 g/BHp-hr 3.1 lbs NOx/hr
TX-0404	Reliant Energy Renewables Security LP, Montgomery County, Texas	Four IC engines (landfill gas-fired, 1664.0 kW each) ≈2232 hp	Good combustion practices	0.6 g/BHp-hr, (BACT) 2.95 lbs NOx/hr
TX-0495	Bio Energy Texas, LLC	Eight IC engines (landfill gas-fired, 2172 BHp each)	Lean burn technology,	0.6 g/BHp-hr, (BACT) 2.87 lbs NOx/hr
VA-288	Industrial Power Generating Corp., INGENCO, Chesapeake County, Virginia	36 IC engines (six groups of six engines, 550 Hp each)	Air/fuel ratio control, turbocharging, cooling system	2.1 lbs/mmBtu ≈2.94 lbs NOx/hr
VT-0019	New England Waste Services, Inc., Orleans County, Vermont	Four IC engines (landfill gas-fired, 1600 kW, 2221 Hp each)	Low emission engine design	0.50 g/BHp-hr 1-hour avg. 2.45 lbs NOx/hr

7.0 – Selection of BACT for NOx

The proposed BACT technology for the eight gensets units is good combustion control based on manufacturer engine and combustion control module design. The manufacturer guaranteed 0.50 g/hp-hr and corresponding 2.46 lb/hr emission rates are the proposed good combustion control performance limits for each of the eight gensets proposed in this application.

Sampson County Disposal Landfill proposes as BACT the use of good combustion practices for NOx emissions from the internal combustion engines. The BACT limit for each of the internal combustion engines is: NOx = 0.50 g/hp-hour. This BACT limit is equal to or less than the limits listed in the RBLC database for engines of equal size ratings and reflects the degradation of new engines after 100 hours (less than 5 days) of operation. These engines are required to meet the BACT limit over the life of each engine. Compliance with this emission limit will be determined by an initial performance test within 60 to 180 days after normal operation testing for the lbs NOx per hour as a surrogate for the g/hp-hour BACT limit.

C. ----------PARTICULATE MATTER (PM_{10}) BACT ANALYSIS----------

1.0 Sources of Particulate Matter (PM_{10}) Emissions

The sources of PM/PM10 emissions associated with this project are the eight genset units.

1.1 PM_{10} Formation Processes

Potential PM_{10} emissions from the eight new gensets primarily result from incomplete combustion of the organic and inorganic compounds in the landfill gas burned. The gensets are designed and certified by the manufacturer to comply with the Spark Ignition NSPS emission limits for the other criteria pollutants. However, combustion adjustments to reduce NOx emissions may result in increased emissions of PM that is a product of incomplete combustion. The proposed Caterpillar G3520C engine with the electronic engine control module is designed to automatically adjust the ignition timing and air/fuel ratio to maximize combustion efficiency.

C. ----------PARTICULATE MATTER (PM_{10}) BACT ANALYSIS----------

Since spark ignition engines are generally relatively low emitters of PM, the Spark Ignition NSPS does not specify any PM limits for engine manufacturers. The engine manufacturer also does not specify a PM emission rate guarantee. Projected PM emissions from each of the eight proposed gensets in this application are based on the AP-42 emission factor for IC engines fired with LFG. The AP-42 PM emission factor (Table 2.4-5) is 48.0 lb/10^6 dscf of methane. At the LFG 100% firing rate of the engines and a 50% methane content in the LFG, each 2,233 Hp engine has a potential PM emission rate of 0.74 lb/hr and 3.25 tons/yr at 8,760 hrs/yr of operation. The eight generators have a total potential PM emission rate of 5.94 lb/hr and 26.02 ton/yr at 8,760 hrs/yr operation at 100% capacity. All of the PM can be assumed to be PM_{10}.

2.0 -- Identification of PM/PM_{10} Control Options

This section reviews the available PM/PM10 control technologies that were considered for the Sampson County Disposal Landfill Facility.

2.2 Good Combustion Control

On January 18, 2008, the US EPA promulgated the Standards of Performance for Stationary Spark Ignition IC engines (SI NSPS) in 40 CFR Part 60, Subpart JJJJ. These regulations established manufacturer design model-year engine specific CO, NOx, and VOC emissions limits for different engine sizes firing different fuels. The NSPS regulation did not establish a PM10 standard. The established limits for CO, NOx, and VOCs are based on good combustion control engine design. This design will also help to control the PM/PM10 emissions.

2.2 Catalytic Oxidation

On July 11, 2006, the US EPA promulgated the Standards of Performance for Stationary Reciprocating Internal Combustion Engines in 40 CFR Part 60, Subpart IIII. The control technology base for the NSPS standard for engines greater than 500 Hp at major HAP sources was the catalyzed diesel particulate filter. The catalyst that is in these devices lowers the required combustion temperatures for affected pollutants and allows oxidation of the pollutants at the engine exhaust temperatures as well as capturing PM/PM10.

3.0 -- Elimination of Technically Infeasible PM/PM10 Control Options

The second step in the BACT analysis for PM/PM10 is to eliminate any technically infeasible or undemonstrated control technologies. Each control technology is considered and those that are infeasible based on physical, chemical, and engineering principles or are undemonstrated in the Gas-to-Energy industry were eliminated.

3.1 Good Combustion Practices

This is a technically feasible option and will be further considered in the BACT analysis.

3.2 Catalytic Oxidation

The RICE MACT and the spark ignition NSPS state that landfill gas contains a family of silicon-based gases collectively called siloxanes. Combustion of siloxanes form compounds that have been known to foul fuel systems, combustion chambers, and post-combustion catalyst, rendering them inoperable in a short period of time. Catalyst poisoning would also prohibit the installation of a catalytic oxidizer on the exhaust of the genset engines. As documented by the US EPA, oxidation catalysts have been determined to be technically infeasible control options for landfill gas-fired engines. No catalytic oxidation units are currently being used on any Gas-to-Energy facilities in the U.S.

4.0 -- Ranking of Technically Feasible PM/PM10 Control Options

4.1 Evaluation of Technically Feasible PM/PM10 Control Options

The third step in the BACT analysis for PM/PM10 is to complete the analysis of the feasible control technologies and document the results. The feasible control technologies are evaluated on the basis of economic, environmental, and energy considerations.

The only control technology option that is considered technically feasible for this project for the control of PM/PM10 emissions is good combustion control practices in conjunction with the spark ignition New Source Performance Standard, Subpart JJJJ for the other criteria pollutants.

C. ----------PARTICULATE MATTER (PM_{10}) BACT ANALYSIS----------

5.0 -- Evaluation of Technically Feasible PM/PM10 Control Options

The fourth step in the BACT analysis for PM/PM10 emissions from this project is to complete the analysis of the applicable control technologies and to document the results. The feasible control technologies are evaluated on the basis of economic, energy, and environmental considerations. Sampson County Disposal Landfill is proposing to control PM/PM10 emissions from this project by the use of good combustion control practices. No other technologies appear to be technically feasible for this project.

6.0 -- RBLC Database Search

RBLC Database Search Results Summary for PM and PM10 are included in the following table. A BACT analysis review on the EPA website was conducted for PM/PM10 at Gas-to-Energy facilities. This section reviews the available control technologies that apply to the proposed project. In preparing this section, a review of EPA's emission standard determination methods for the reciprocating internal combustion engines was made. EPA evaluated several types of control methods in developing the NSPS and NESHAP for this type of combustion device. In establishing and promulgating the NSPS and NESHAP emission limits, EPA focused mainly on good combustion practices.

The RBLC database was queried for emission sources and control devices of PM/PM10 for internal combustion engines. Specifically the following parameters were entered into the search page:

- Search Database - RBLC Basic Search
- Permit dates: 01/01/99 – 10/02/2009
- Processes code: 17.140 "Large (>500 Hp) Combustion Engines burning landfill gas/Digester gas/Bio-Gas
- Process name: Internal Combustion Engine
- Pollutant Name: PM/PM10
- Corporate/Company or Facility Name Contains: Blank
- Facility State: All States
- Report: Comprehensive Report (As sorted in results table)

RBLC Database Search Results Summary For PSD Projects (landfill gas-fired generators) – PM10

RBLC ID	Company	Source Process description	Technology Applied	Limit
CA-0122	Chino Basin Desalter Authority San Bernardio County, California	One IC engines (landfill gas-fired, 1410.0 Hp)	None	0.2 lbs/hr (BACT)
CA-1092	MM San Bernardino Energy, LLC San Bernardio County, California	One IC engine (digester gas-fired, 10.75 mmBtu per hour) 1408 bhp	None	0.2 lbs/hr (BACT)
FL-0289	Trail Ridge Energy, LLC Duval County, Florida	One IC engine (landfill gas-fired, 14.7 mmBtu per hour) 1850 bhp	None	0.24 g/BHp-hr 1.18 lbs/hr (BACT)
FL-0290	Seminole Energy, LLC Osceola Road Solid Waste Management Facility, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	None	0.24 g/BHp-hr 1.18 lbs/hr (BACT)
FL-291	Brevard Energy, LLC Brevard County, Florida	Six IC engines (landfill gas-fired, 1.6 MW each) 2146 hp	None	0.24 g/BHp-hr 1.18 lbs/hr (BACT)
ME-0036	New England Waste Services of ME, Inc., Penobscot County, Maine	Three IC engines (landfill gas-fired, 10.8 mmBtu/hr) ≈1359 hp	None	0.05 lbs/mmBtu 0.49 lbs/hr (BACT)
MI-0371	Sumpter Energy Associates Wayne County, Michigan	Six IC engines (landfill gas-fired, 8.60 mmBtu per hour each)	None	None
NH-0014	University of New Hampshire Stafford County, New Hampshire	Two IC engines (landfill gas-fired, 1600 kW each) ≈2145 hp	Filtering of inlet air	0.1 g/BHp-hr 3-hr average (Stack test)
NJ-0067	Burlington County Resource Recovery, Burlington County, New Jersey	Five IC engines (landfill gas-fired, 12.5 mmBtu/hr, 1500kW each) ≈2012 hp	None	0.75 lbs/hr (BACT)

-Table continued on the next page-

RBLC Database Search Results Summary For PSD Projects (landfill gas-fired generators) – PM10

RBLC ID	Company	Source Process description	Technology Applied	Limit
NJ-0068	Manchester Renewable Power Corporation (LES), Ocean County, New Jersey	Six IC engines (16.38 mmBtu/hr, 2233 Hp, 1600 kW)	None	0.20 g/BHp-hr 0.98 lbs/hr (BACT)
NJ-0069 (Draft)	Monmouth County Reclamation Center, Monmouth County, New Jersey	One IC engine (landfill gas-fired, lean burn, 9.81 mmBtu/hr, 1468 BHp, 1000 kW)	None	0.58 lbs/hr (BACT)
OH-0260	Bio-Energy, LLC, Mahoning County, Ohio	Sixteen IC engines (landfill gas-fired, 14.0 mmBtu/hr, 1877 BHp, 1400 kW each)	None	0.40 lbs/hr (BACT)
RI-0022	Ridgewood Power Management, LLC, Providence County, Rhode Island	Four IC engine generator sets (landfill gas-fired, 2229.0 Hp each)	None	0.10 g/BHp-hr 1-hr avg. 0.49 lbs/hr 1-hr avg. (BACT)
TX-0385	Reliant Energy Renewables Coastal Plains LP, Galveston County, Texas	Seven IC engines (landfill gas-fired, 2343 BHp each)	None	0.49 lbs/hr
TX-0404	Reliant Energy Renewables Security LP, Montgomery County, Texas	Four IC engines (landfill gas-fired, 1664.0 kW each) ≈2232 hp	Good combustion practices	0.84 tons/year each
TX-0495	Bio Energy Texas, LLC	Eight IC engines (landfill gas-fired, 2172 BHp each)	Gas pretreatment, proper maintenance	0.71 lbs/hour (BACT)
VA-0288	Industrial Power Generating Corp., INGENCO, Chesapeake County, Virginia	36 IC engines (six groups of six engines, 550 Hp each)	Proper engine maintenance	0.11 lbs/mmBtu

7.0 -- Selection of BACT for PM/PM10

Sampson County Disposal Landfill proposes as BACT the use of good combustion practices for PM/PM10 emissions from the internal combustion engines. The BACT limit for each of the internal combustion engines is: PM/PM10 = 0.15 g/hp-hour. This BACT limit is equal to or less than the limits listed in the RBLC database for engines of equal size ratings and reflects the degradation of new engines after 100 hours (less than 5 days) of operation. These engines are required to meet the BACT limit over the life of each engine. Compliance with this emission limit will be determined by an initial performance test within 60 to 180 days after normal operation testing for the lbs PM/PM10 per hour as a surrogate for the g/hp-hour BACT limit.

D. ----------PARTICULATE MATTER ($PM_{2.5}$) BACT ANALYSIS----------

1.0 Sources of Particulate Matter ($PM_{2.5}$) Emissions

The sources of $PM_{2.5}$ emissions associated with this project are the 8 genset units.

1.1 $PM_{2.5}$ Formation Processes

Potential $PM_{2.5}$ emissions from the eight new gensets primarily result from incomplete combustion of the organic and inorganic compounds in the landfill gas burned. The gensets are designed and certified by the manufacturer to comply with the Spark Ignition NSPS emission limits for the other criteria pollutants. However, combustion adjustments to reduce NOx emissions may result in increased emissions of $PM_{2.5}$ that is a product of incomplete combustion. The proposed Caterpillar G3520C engine with the electronic engine control module is designed to automatically adjust the ignition timing and air/fuel ratio to maximize combustion efficiency.

D. ----------PARTICULATE MATTER ($PM_{2.5}$) BACT ANALYSIS----------

Since spark ignition engines are generally relatively low emitters of $PM_{2.5}$, the Spark Ignition NSPS does not specify any $PM_{2.5}$ limits for engine manufacturers. The engine manufacturer also does not specify a $PM_{2.5}$ emission rate guarantee. Projected $PM_{2.5}$ emissions from each of the eight proposed gensets in this application are based on the AP-42 emission factor (Table 2.4-5) for IC engines fired with LFG. The AP-42 PM emission factor for $PM_{2.5}$ is the same as the emission factor for PM10 per AP-42. This value is 48.0 lbs/10^6 dscf of methane. At the LFG 100% firing rate of the engines and a 50% methane content in the LFG, each 2,233 Hp engine has a potential PM emission rate of 0.74 lb/hr and 3.25 tons/yr at 8,760 hrs/yr of operation. The eight generators have a total potential PM emission rate of 5.94 lb/hr and 26.02 ton/yr at 8,760 hrs/yr operation at 100% capacity.

2.0 -- Identification of $PM_{2.5}$ Control Options

This section reviews the available $PM_{2.5}$ control technologies that were considered for the Sampson County Disposal Landfill Facility.

2.3 Good Combustion Control

On January 18, 2008, the US EPA promulgated the Standards of Performance for Stationary Spark Ignition IC engines (SI NSPS) in 40 CFR Part 60, Subpart JJJJ. These regulations established manufacturer design model-year engine specific CO, NOx, and VOC emissions limits for different engine sizes firing different fuels. The NSPS regulation did not establish a PM10 standard. The established limits for CO, NOx, and VOCs are based on good combustion control engine design. This design will also help to control the $PM_{2.5}$ emissions.

2.2 Catalytic Oxidation

On July 11, 2006, the US EPA promulgated the Standards of Performance for Stationary Reciprocating Internal Combustion Engines in 40 CFR Part 60, Subpart IIII. The control technology base for the NSPS standard for engines greater than 500 Hp at major HAP sources was the catalyzed diesel particulate filter. The catalyst that is in these devices lowers the required combustion temperatures for affected pollutants and allows oxidation of the pollutants at the engine exhaust temperatures as well as capturing $PM_{2.5}$.

3.0 -- Elimination of Technically Infeasible PM/PM10 Control Options

The second step in the BACT analysis for $PM_{2.5}$ is to eliminate any technically infeasible or undemonstrated control technologies. Each control technology is considered and those that are infeasible based on physical, chemical, and engineering principles or are undemonstrated in the Gas-to-Energy industry were eliminated.

3.1 Good Combustion Practices

This is a technically feasible option and will be further considered in the BACT analysis.

3.2 Catalytic Oxidation

The RICE MACT and the spark ignition NSPS state that landfill gas contains a family of silicon-based gases collectively called siloxanes. Combustion of siloxanes form compounds that have been known to foul fuel systems, combustion chambers, and post-combustion catalyst, rendering them inoperable in a short period of time. Catalyst poisoning would also prohibit the installation of a catalytic oxidizer on the exhaust of the genset engines. As documented by the US EPA, oxidation catalysts have been determined to be technically infeasible control options for landfill gas-fired engines. No catalytic oxidation units are currently being used on any Gas-to-Energy facilities in the U.S.

4.0 -- Ranking of Technically Feasible PM/PM10 Control Options

4.1 Evaluation of Technically Feasible $PM_{2.5}$ Control Options

The third step in the BACT analysis for $PM_{2.5}$ is to complete the analysis of the feasible control technologies and document the results. The feasible control technologies are evaluated on the basis of economic, environmental, and energy considerations.

The only control technology option that is considered technically feasible for this project for the control of $PM_{2.5}$ emissions is good combustion control practices in conjunction with the spark ignition New Source Performance Standard, Subpart JJJJ for the other criteria pollutants.

C. ----------PARTICULATE MATTER ($PM_{2.5}$) BACT ANALYSIS----------

5.0 -- Evaluation of Technically Feasible PM/PM10 Control Options

The fourth step in the BACT analysis for $PM_{2.5}$ emissions from this project is to complete the analysis of the applicable control technologies and to document the results. The feasible control technologies are evaluated on the basis of economic, energy, and environmental considerations. Sampson County Disposal Landfill is proposing to control $PM_{2.5}$ emissions from this project by the use of good combustion control practices. No other technologies appear to be technically feasible for this project. The EPA RBLC data base does not list any control technologies that have been installed on this type of project.

6.0 -- RBLC Database Search

RBLC Database Search Results Summary for $PM_{2.5}$ are included in the following table. A BACT analysis review on the EPA website was conducted for $PM_{2.5}$ at Gas-to-Energy facilities. This section reviews the available control technologies that apply to the proposed project. In preparing this section, a review of EPA's emission standard determination methods for the reciprocating internal combustion engines was made. EPA evaluated several types of control methods in developing the NSPS and NESHAP for this type of combustion device. In establishing and promulgating the NSPS and NESHAP emission limits, EPA focused mainly on good combustion practices.

The RBLC database was queried for emission sources and control devices of $PM_{2.5}$ for internal combustion engines. Specifically the following parameters were entered into the search page:

- Search Database - RBLC Basic Search
- Permit dates: 01/01/99 – 10/02/2009
- Processes code: 17.140 "Large (>500 Hp) Combustion Engines burning landfill gas/Digester gas/Bio-Gas
- Process name: Internal Combustion Engine
- Pollutant Name: PM/PM10
- Corporate/Company or Facility Name Contains: Blank
- Facility State: All States
- Report: Comprehensive Report (As sorted in results table)

RBLC Database Search Results Summary For PSD Projects (landfill gas-fired generators) – PM2.5

RBLC ID	Company	Source Process description	Technology Applied	Limit
NJ-0068	Manchester Renewable Power Corporation (LES), Ocean County, New Jersey	Six IC engines (2233 Hp each, 1600 kW each)	None	0.20 g/BHp-hr 0.98 lbs/hr (BACT)

7.0 -- Selection of BACT for $PM_{2.5}$

Sampson County Disposal Landfill proposes as BACT the use of good combustion practices for $PM_{2.5}$ emissions from the internal combustion engines. The selected BACT limit for $PM_{2.5}$ from each of the internal combustion engines is = 0.15 g/hp-hour. This BACT limit is equal to or less than the limits listed in the RBLC database for engines of equal size ratings and reflects the degradation of new engines after 100 hours (less than 5 days) of operation. These engines are required to meet the BACT limit over the life of each engine. Compliance with this emission limit will be determined by an initial performance test within 60 to 180 days after normal operation testing for the lbs $PM_{2.5}$ per hour as a surrogate for the g/hp-hour BACT limit.

VI. Dispersion Modeling Analysis

The PSD modeling analysis described in this section was conducted in accordance with current PSD directives and modeling guidance. Mr. Jerry Freeman of the DAQ Air Quality Analysis Branch reviewed the modeling analysis.

Sampson County Disposal (SCD) plans to install a set of generators, a backup large flare, and a small auxiliary flare to assist in consuming the gas produced by the landfill. These sources will add to a large flare already on site. The generator set will consist of eight 1,600 kW units which will produce electricity from the combustion of the landfill gas. Normal maximum operation will consist of one of the large flares and the generator sets operating simultaneously. Alternative scenarios are: 1) the two large flares operating simultaneously; 2) the small flare operating with one of the large flares; or 3) the generators operating with the small flare. Three pollutants were declared to exceed their PSD Significant Emission Rate (SER) and thus required a PSD modeling analysis.

PM10 SIL

Source ID	Source Description	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM (lb/hr)
1	gs1	9.144	753.15	43.8253	0.4064	0.74
2	gs2	9.144	753.15	43.8253	0.4064	0.74
3	gs3	9.144	753.15	43.8253	0.4064	0.74
4	gs4	9.144	753.15	43.8253	0.4064	0.74
5	gs5	9.144	753.15	43.8253	0.4064	0.74
6	gs6	9.144	753.15	43.8253	0.4064	0.74
7	gs7	9.144	753.15	43.8253	0.4064	0.74
8	gs8	9.144	753.15	43.8253	0.4064	0.74

CO SIL

Source ID		Source Description	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	CO (lb/hr)
	1	gs1	9.144	753.15	43.8253	0.4064	13.54
	2	gs2	9.144	753.15	43.8253	0.4064	13.54
	3	gs3	9.144	753.15	43.8253	0.4064	13.54
	4	gs4	9.144	753.15	43.8253	0.4064	13.54
	5	gs5	9.144	753.15	43.8253	0.4064	13.54
	6	gs6	9.144	753.15	43.8253	0.4064	13.54
	7	gs7	9.144	753.15	43.8253	0.4064	13.54
	8	gs8	9.144	753.15	43.8253	0.4064	13.54

NOx NAAQS (SIL & Increment with just the gensets)

Source ID		Source Description	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	NOX (lb/hr)
	1	gs1	9.144	753.15	43.8253	0.4064	2.46
	2	gs2	9.144	753.15	43.8253	0.4064	2.46
	3	gs3	9.144	753.15	43.8253	0.4064	2.46
	4	gs4	9.144	753.15	43.8253	0.4064	2.46
	5	gs5	9.144	753.15	43.8253	0.4064	2.46
	6	gs6	9.144	753.15	43.8253	0.4064	2.46
	7	gs7	9.144	753.15	43.8253	0.4064	2.46
	8	gs8	9.144	753.15	43.8253	0.4064	2.46
DAKHTR		off-site	19.812	505.37	6.705578	0.9144	52.3
DAKBLR		off-site	45.72	505.37	21.336	1.524	93.6
DAKNB		off-site	22.86	566.48	6.705578	0.9144	10

Existing Flare Onsite	Flare Ht (m)	NOX (lb/hr)
Large	13.7	9.61
New Flares Onsite		
Large	13.7	9.61
Small	6	1.43
Offsite NAAQS Flares SCLF 32.3	9.4	2.2
SCLF 4.8	4.6	0.33

Preliminary Impact Air Quality Modeling Analysis

An air quality preliminary impact analysis was conducted for the pollutants that require PSD analysis and have Significant Impact Levels (SIL). The modeling results were then compared to the applicable SIL as defined in the NSR Workshop Manual to determine if a full impact air quality analysis would be required for that pollutant.

SCD is located near Roseboro, North Carolina, in Sampson County. The area is a mix of forests, farmland, and residential areas. For modeling purposes, the area, including and surrounding the site, is classified "rural", based on the land use type scheme established by Auer 1978.

SCD evaluated three criteria pollutants and compared the High First-High (H1H) results to the SIL. Two EPA models were used in the air dispersion demonstration. SCREEN3 was utilized for its capability to handle flare sources, while the rest of the modeling (generators and off-site point sources) was performed with AERMOD. The first step in the SIL analysis was to individually model: 1) the new generator sets; 2) the new large flare (identical to the existing flare); and 3) the new small flare. Of these, the generator sets had the overwhelmingly largest impact by an order of magnitude. In the operating scenarios described in the preceding section, the existing large flare can be considered to net out either the large or small new flares, leaving the new generator sets as the essential project to model for comparison to the SIL.

SCD included adequate receptors in the modeling. They used a 100-meter spacing along the fenceline, part of which is to be constructed with this project. All maxima occurred in areas of 100 meter receptor spacing, and receptors were included out to about 7 km, well beyond maximum impacts. Normal regulatory defaults were used in the model, as were five years of NCDAQ processed meteorology, using surface data from the NWS surface station in Raleigh-Durham and upper air data from the Greensboro station. NCDAQ has determined that this data is representative of the facility site. As the modeling results (H1H) in Table 2 show, only NOx exceeded its SIL and required further modeling. The NOx Significant Impact Area (SIA) established by the SIL modeling was rounded up to 1 km.

Table 2 - Class II Significant Impact Results (ug/m^3)

Pollutant	Averaging Period	Facility maximum Impact	Class II Significant Impact	Percent of SIL
NOx	Annual	1.74	1	174
PM_{10}	Annual	0.52	1	52
	24-hour	3.61	5	72
CO	8-hour	119.8	500	24
	1-hour	170.4	2000	9

Class II Area Full Impact Air Quality Modeling Analysis

A Class II Area NAAQS and PSD increment analysis was performed for NOx and included offsite source emissions and background concentrations. SCD used AERMOD and SCREEN3 with the modeling methodology as described above. The results of the modeling were added together as appropriate to determine a conservative, modeling impact. Off-site source inventories for both increment and NAAQS modeling were obtained from NCDAQ and then refined by SCD by the NCDAQ approved "Q/D=20" guideline. Five offsite sources were included in the NAAQS modeling, two flares (Sampson County Landfill) and three point sources from DAK. The results are provided in Table 3 below.

Table 3 - Class II Area NAAQS Modeling Results

Pollutant	Averaging Period	Modeled Impact (ug/m3)	Background Concentration (ug/m3)	Total Impact (ug/m3)	NAAQS (ug/m3)	% NAAQS
NO_2	Annual	2.38	26	28.4	100	28

In the Class II PSD increment analysis for NOx, the Q/D technique rule resulted in only the facility project sources being modeled (i.e. 8 generator sets). This project is the first PSD project in the county and thus will determine the minor source baseline date for Sampson County. The Class II increment results are shown in Table 4 and indicate compliance.

Table 4 - Class II Area PSD Increment Modeling Results

Pollutant	Averaging Period	Modeled Impact (ug/m3)	PSD Increment (ug/m3)	% Increment
NO_2	Annual	1.74	25	7

Non Regulated Pollutant Impact Analysis (North Carolina Toxics and TSP)

SCD modeled HCL using AERMOD with the same receptor array and meteorology as in the NAAQS analysis. The eight generators (as a set) and the large onsite flare were modeled separately with the entire permitted emission rate. The generators produced the largest impact, which was then compared to the NC Acceptable Ambient Level (AAL) for HCL. The maximum concentrations (shown in Table 5) occurred along the fencelines, and indicated compliance with the HCL AAL.

Table 5 - Toxics Modeling Results

Pollutant	Averaging Period	Max Impact (ug/m3)	AAL	Percent of AAL
HCL	1-hr	374	700	53

SCD declared that Total Suspended Particulates (TSP) emission rates are identical to the PM10 rates; subsequently, the PM10 modeling results were used to show that the TSP modeled results would also be below the TSP SIL and require no further modeling.

Table 6 - TSP Modeling Results

Pollutant	Averaging Period	Modeled Impact (ug/m3)	TSP SIL (ug/m3)	% SIL
TSP	Annual	0.52	1	52
	24-hour	3.61	5	72

Additional Impact Analysis

Additional impact analyses were conducted for growth, soils and vegetation, and visibility impairment. The primary environmental benefit of the proposed project is to reduce fossil fuel generated greenhouse gases associate with electricity production by coal-fired power plants.

Growth Impacts

This project does not increase the operational rate of the landfill, and no area growth is anticipated. Installation of the gensets and flares will not affect the maximum disposal capacity of the landfill or waste disposal rates. This modification is not expected to have any significant effect on the existing population, associated emissions, or economic growth in the area.

Soils and Vegetation

The Clean Air Act has established two types of National Ambient Air Quality Standards (NAAQS). Primary standards set limits to protect public health, including the health of the sensitive population such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against visibility impairment, and damage to animals, crops, vegetation, and buildings. The NAAQS were designed to protect human health as well as animals, plants, and soils in the environment.

Class II Visibility Impairment Analysis

A Class II visibility impairment analysis was performed using VISCREEN. The VISCREEN modeling results showed no visibility impact in the nearest Class I area (Swan Quarter National Wildlife Refuge). The maximum Class II area change in light extinction is 0.32 at a distance 20.6 km relative to the 2.0 Level 1 screening criteria. The maximum contrast change is 0.003 relative to the 0.05 Level 1 screening criteria. The Level 1 screening criteria are not exceeded in the nearest Class I area and the Class II area at a distance of 20.6 km from the site. There are no scenic areas within 20.6 km of the landfill site. Since no screening levels were exceeded, no further visibility modeling was required.

Class I Increment/Air Quality Related Values (AQRV) Regional Haze Impact and Deposition Analyses

The closest Class I area to SCD is Swan Quarter National Wildlife Refuge which is about 195 km to the northeast. The appropriate Federal Land Manager (FLM) determined that an AQRV analysis was not required for this project; subsequently, NCDAQ did not require a CLASS I SIL or increment analysis.

PSD Air Quality Modeling Result Summary

Based on the PSD air quality ambient impact analysis performed, the proposed Sampson County Disposal project will not cause or contribute to any violation of the Class II NAAQS, PSD increments, Class I Increments, or any FLM AQRVs. A summary of the modeling results is presented in Table 10.

TABLE 10 – SAMPSON COUNTY LANDFILLPSD AIR QUALITY MODELING RESULTS

SER Evaluation

Pollutant	Annual E/R (Tons)	Significant Emission Rate (Tons/yr)	Modeling Required?				
NOx	86	40	Yes				
PM_{10}	26	15	Yes				
$PM_{2.5}$	26	To Be Determined	Yes				
SO_2	8	40	No				
CO	474	100	Yes				
VOC's	----------	40	No				
H_2S	0.47	10	No				

Class II Area SIL Analysis

Pollutant	Averaging Period	Maximum Impact (ug/m^3)	SIL (ug/m^3)	SIL Exceeded			
NO_x	Annual	1.74	1	Y			
PM_{10}	Annual	0.52	1	N			
	24-hour	3.61	5	N			
CO	8-hour	120	500	N			
	1-hour	170	2000	N			

Class II NAAQS Analysis

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	Back Ground Conc (ug/m^3)	Total Impact (ug/m^3)	NAAQS (ug/m^3)	% NAAQS
NOx	Annual	2.38	26	28.4	100	28

Class II PSD Increment Analysis

Pollutant	Averaging Period	Maximum Onsite & Offsite Source Impacts (ug/m^3)	Back Ground Conc (ug/m^3)	Total Impact (ug/m^3)	PSD Increment (ug/m^3)	% PSD
NO2	Annual	1.74	N/A	1.74	25	7

Non Regulated Pollutants

NC Toxic Pollutants

Pollutant	Averaging Period	Maximum Impact (ug/m^3)	AAL (ug/m^3)	% AAL			
HCL	1-Hr	374	700	53			

Total Suspended Particulates

Pollutant	Averaging Period	Modeled Impact (ug/m3)	TSP SIL (ug/m3)	% SIL
TSP	Annual	0.52	1	52
	24-hour	3.61	5	72

PM2.5 Modeling

At the request of DAQ, the facility modeled PM2.5 emissions with the procedure and standards currently recommended by DAQ. Mr. Jerry Freeman of the DAQ Air Quality Analysis Branch reviewed the modeling analysis which was received on December 17, 2009. The analysis performed was a National Ambient Air Quality Standards (NAAQs) analysis for PM2.5. Three scenarios of operations, differentiated by the locations of fugitive sources, were modeled to account for both current and future conditions. The three scenarios have the same emission rates for the generators and the operationally disturbed particulates. The haul road emissions are different due to the varying lengths in the scenarios. The analyses did demonstrate compliance with NAAQss for PM2.5.

Sampson County Disposal used a combination of AERMOD and ScreeN3 to model the facility. SCREEN3 was used for the flare (worst case flare was determined), and the results added to the AERMOD results for the remaining sources. This is a conservative use of the models. In AERMOD use, SCD correctly followed DAQ's specific guidance for PM2.5 modeling. Additionally, a background concentration, which was supplied by the DAQ, was added to the modeled results for both the 24-hour period and the annual period. Per the DAQ policy, no off-site sources were required for demonstration.

Three different fenceline locations were modeled (C7, C9, and C11). These different scenarios represent the current fenceline and the future fencelines at this facility as it continues to grow in size.

Scenario C7 (currently permitted conditions at the site)

PM10 SIL

Source ID	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM2.5 (lb/hr)
GenSet1	9.144	753.15	43.8253	0.4064	0.74
GenSet2	9.144	753.15	43.8253	0.4064	0.74
GenSet3	9.144	753.15	43.8253	0.4064	0.74
GenSet4	9.144	753.15	43.8253	0.4064	0.74
GenSet5	9.144	753.15	43.8253	0.4064	0.74
GenSet6	9.144	753.15	43.8253	0.4064	0.74
GenSet7	9.144	753.15	43.8253	0.4064	0.74
GenSet8	9.144	753.15	43.8253	0.4064	0.74

Source ID	Release Height (m)	Easterly Length (m)	Northerly Length (m)	PM2.5 (lbs/hour)
Bulldozing	3.048	45.72	45.72	0.072
Wind blown	3.048	38.1	7.62	0.016
Volume Sources				
PR1	4	4.2	3.7	0.4025
URF	4	4.2	3.7	1.496

Volume sources = haul roads comprised of numerous smaller volumes

SCREEN 3

Source		Emission Rate
Flare CD1	=	2.64 lbs/hour

Scenario C9 (future conditions at the site)

PM10 SIL

Source ID	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM2.5 (lb/hr)
GenSet1	9.144	753.15	43.8253	0.4064	0.74
GenSet2	9.144	753.15	43.8253	0.4064	0.74
GenSet3	9.144	753.15	43.8253	0.4064	0.74
GenSet4	9.144	753.15	43.8253	0.4064	0.74
GenSet5	9.144	753.15	43.8253	0.4064	0.74
GenSet6	9.144	753.15	43.8253	0.4064	0.74
GenSet7	9.144	753.15	43.8253	0.4064	0.74
GenSet8	9.144	753.15	43.8253	0.4064	0.74

Source ID	Release Height (m)	Easterly Length (m)	Northerly Length (m)	PM2.5 (lbs/hour)
Bulldozing	3.048	45.72	45.72	0.072
Wind blown	3.048	38.1	7.62	0.016
Volume Sources				
PR1	4	4.2	3.7	0.4025
URF	4	4.2	3.7	1.496
UR9	4	4.2	3.7	1.5708

Volume sources = haul roads comprised of numerous smaller volumes

SCREEN 3

Source		Emission Rate
Flare CD1	=	2.64 lbs/hour

PM2.5 Modeling Results

	Modeled Impact ug/m3	Background ug/m3	Total Impact	Standard ug/m3	Percent of Standard	Worse Case Scenario
PM2.5 24-hr	20.4	14.06	34.5	35	99	C7
PM2.5 annual	10.4	3.98	14.4	15	96	C9

background supplied by NCDAQ

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VII. 15A NCAC 2Q .0700 "Toxic Air Pollutant Procedures"

The proposed installation of the 8 genset units and the two additional flares will emit quantities of North Carolina regulated toxic air pollutants (TAPs) from the facility. In December 2005, Sampson County Disposal Landfill performed a facility wide toxic modeling exercise using the maximum gas generation from the facility over the lifetime of the landfill. The consultant (G.N. Richardson) evaluated the toxics emitted from the landfill by using the most conservative approach possible for the emissions from the landfill.

The calculations for the emission rates used in this evaluation are based on 100% fugitive emissions from the landfill with no capture and control efficiencies taken into account. However, the HCL emissions from the combustion of landfill gas in the flare were calculated using the collection and control efficiencies to route the maximum amount of landfill gas through the flare.

In this modification to install the eight genset units, the combustion of landfill gas in the generators will also create HCL emissions. However, the landfill gas that will be burned in the genset units is the same potential amount that would have been burned in the flares. When the facility was modeled in 2005, it took into account the combustion of all of the future landfill gas that would be generated at the facility through the life of the landfill whether the gas is combusted in the flare or the internal combustion engines.

This conservative approach to calculating the emissions from the landfill in 2005 yielded fifteen toxic pollutants (1,1,2,2-tetrachloroethane, ethylene chloride, acrylonitrile, benzene, dichlorofluoromethane, methylene chloride, ethyl mercaptan, hexane, hydrogen chloride, hydrogen sulfide, methyl mercaptan, Toluene, trichloroethene, vinyl chloride, and xylenes) that were shown to be greater than the TPERs listed in 15A NCAC 2Q .0711.

The SCREEN3 model was run in simple and complex terrain to evaluate one landfill area source and one flare. The facility ran the model as a volume source, but the Air Quality Analysis Branch re-modeled the facility as an area source. A unity run was performed using an emission rate of 1g/s for each source to find the worst-case source. Receptors were located out to 5,000 meters, beginning at one meter from the source. There are no significant structures on site, so a cavity analysis was not required. The DAQ Air Quality Analysis Branch Comments (Toxics memo dated November 8, 2005, from Jamie Sellman, Meteorologist) indicated that the toxics modeling analysis for the Sampson County Disposal, LLC landfill was is in compliance for all 15 toxic air pollutants (including HCL) modeled. The DAQ Air Quality Analysis Branch Comments (Toxics memo dated June 18, 2009, revised on September 22, 2009), from Jerry Freeman, Meteorologist) indicated that the toxics modeling analysis for HCL from the Sampson County Disposal, LLC landfill was in compliance for HCL from the worse case scenario of burning the landfill gas in the eight genset units.

NC Toxic Pollutants						
Pollutant	**Averaging Period**	**Maximum Impact (ug/m^3)**	**AAL (ug/m^3)**	**% AAL**		Emission Rate
HCL	1-Hr	374	700	53		238 lbs/hr

VIII NOx Rules under 15A NCAC 2D .1400: This regulation does not apply to this project.

IX. Non-Attainment: Sampson County has not been designated nonattainment for the eight-hour ozone standard.

X. A consistency determination is required and was received by this Division on May 14, 2009 with the application. The determination letter from the Clinton-Sampson Planning Department signed by Jeff Vreugdenhol, Planning Director, and stated they had received a copy of the application and that the proposed modification is consistent with applicable zoning and subdivision ordinances.

XI. A Professional Engineer's seal was included with the application. Mr. Stacy G. Smith, PE. a Professional Engineer, who is currently registered in the State of North Carolina, sealed the application for the portions containing the engineering plans, calculations, and all supporting documentation.

XII. An application fee in the amount of $13,488.00 was received on May 14, 2009 with the application.

XIII. This facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store any of the regulated substances in quantities above the thresholds in the Rule.

XIV. **PSD Increment Tracking:**
The Minor Source Baseline date is the earliest date after the trigger date on which a complete PSD application is received by the permit reviewing agency. The minor source baseline date is triggered by a PSD applicant only if the proposed increase in emissions of the pollutant is significant.

Potential pollutant increases for this proposed modification:

PSD Pollutant	PSD Significance Level	Project Emissions	Modeling Required?
Carbon Monoxide	100 tons/yr	474.36 tons/yr	**Yes**
Nitrogen Oxides	40 tons/yr	86.25 tons/yr	**Yes**
Particulate Matter	25 tons/yr	26.02 tons/yr	---
Particulate Matter (PM10)	15 tons/yr	26.02 tons/yr	**Yes**
Particulate Matter (PM2.5)	10 tons/yr	26.02 tons/yr	---
Sulfur Dioxide	40 tons/yr	7.84 tons/yr	No
VOC	40 tons/yr	Actual reduction	No
Lead	0.6 tons/yr	---	---
Asbestos	0.007 tons/yr	---	---
Beryllium	0.0004 tons/yr	---	---
Mercury	0.1 tons/yr	0.00016 tons/yr	No
Vinyl Chloride	1.0 tons/yr	0.089 tons/yr	No
Fluorides	3.0 tons/yr	---	---
Sulfuric Acid Mist	7.0 tons/yr	---	---
Hydrogen Sulfide	10.0 tons/yr	0.47 tons/yr	No
TRS	10.0 tons/yr	0.55 tons/yr	No

The Minor Source Baseline date in Sampson County has been triggered for NOx, and PM10 by this complete PSD application (received May 14, 2009). CO is not triggered because it does not have a PSD increment (see Chapter C table C-2 of 1990 PSD review Workbook).

$$\frac{2.75\ g\ CO}{Hp-hour} \times \frac{2233\ Hp}{unit} \times \frac{8.0\ units}{1} \times \frac{1\ lb\ CO}{453.59\ g\ CO} = \frac{108.31\ lbs\ CO}{hour}$$

$$\frac{0.5\ g\ NOx}{Hp-hour} \times \frac{2233\ Hp}{unit} \times \frac{8.0\ units}{1} \times \frac{1\ lb\ NOx}{453.59\ g\ NOx} = \frac{19.69\ lbs\ NOx}{hour}$$

$$\frac{0.15\ g\ PM10}{Hp-hour} \times \frac{2233\ Hp}{unit} \times \frac{8.0\ units}{1} \times \frac{1\ lb\ PM10}{453.59\ g\ PM10} = \frac{5.91\ lbs\ PM10}{hour}$$

For PSD increment tracking purposes, NOx emissions have increased by **19.69** pounds per hour, and PM-10 emission have increased by **5.91** pounds per hour as a result of this modification.

XV. **Public Notice Requirements** – 40 CFR 51.166(q) requires that the permitting agency make available to the public a preliminary determination on the proposed project, including all materials considered in making this determination. With respect to this preliminary determination the NCDAQ:

A. Will make available in the Roseboro Public Library, located at 300 West Roseboro Street in Roseboro North Carolina, all materials submitted, a copy of the preliminary determination, and all other information submitted and considered.

B. Will make available a copy of this same information will be available at the NCDAQ Fayetteville Regional Office and the NCDAQ Central Office in Raleigh, NC.

C. Will publish a public notice, by advertisement in a local paper including the preliminary decision and the opportunity for public comment.

D. Send a copy of the public notice to:
   1. The applicant
   2. EPA Region IV for comment
   3. Any affected state/local air agency – No other state or local agencies are expected to be affected by this project.
   4. Town of Roseboro.
   5. The Federal Land Manager for the closest Class I area (Swan Quarter National Wildlife Refuge).

XVI. Changes to existing Title V Permit No. 09431T01 per applications (8200139.09A):

Old Page No.	New Page No.	Condition No.	Changes
Page 1	Page 1	Cover letter	Changed date, revised permit number, changed name of responsible official, added PSD modification to description for type of permit, changed received date, added language about 12 month re-submittal of application after operation of proposed sources
Page 2	Page 2	Cover letter	Changed: date on letter, effective date of permit, issue date of permit, Revised cc list at bottom of page, revised signature name, added PSD increment tracking statement
Page 3	Page 3	Cover letter	Changed revision number, revised table of the changes to the permit per application No. 8200139.09A, added note concerning the expiration date of the permit
Body of the Permit			
Page 1	Page 1	Cover page	Changed: Permit No., "Replaces Permit No.", effective date of permit, application No., permit issue date, name of chief of Permitting,
All pages	All pages	Top of pages	Changed permit revision number
Page 3	Page 3	Permitted Emission Sources	Removed the "Part I" designation from the top of the permit along with the two paragraphs, revised the table to reflect the proposed modification of this permit revision, revised the description of the permitted source (landfill)
N/A	Page 4	Specific Limitations and Conditions	Added primary (POS) and alternate operating scenario (AOS) to the table
N/A	Pages 5-10	Specific Limitations and Conditions	Added revised regulations for NSPS Subpart WWW to permit
N/A	Page 12-17	Specific Limitations and Conditions	Added regulatory requirements for the eight new genset units
N/A	Page 17	Multiple Emissions Section	Added Multiple Emissions Section 2.2
Pages 9-17	Pages 19-28	General Conditions	Added revised general conditions

XVII. Conclusion

Based on the application submitted and the review of this proposal by the NCDAQ, the NCDAQ is making a preliminary determination that the project can be approved and a permit issued. A final determination will be made following public notice and comment and consideration of all comments.

Issue Permit 0943T02